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16. Abstract

Since September 1978 the USCG R&D Center has conducted four visual detection experiments to improve the probability of detection in SAR. These are the first in a series of experiments designed to develop visual detection performance models which will be incorporated into the Coast Guard's computer-assisted search planning (CASP) system and the National Search and Rescue Manual.

These were controlled experiments involving 82/95-foot cutters, 41/44-foot boats, helicopters, and fixed wing aircraft searching for 16-foot boat and life raft targets anchored at predetermined locations within the search area.

Through a microwave ranging system, searcher and target positions could be accurately reconstructed to determine the lateral range of targets that were detected, as well as not detected. Thus, probability of detection versus lateral range curves could be developed and, by integrating these curves, sweep width could also be determined. A total of 2,234 detection opportunities was generated. A sophisticated binary multivariate logistic regression computer program was used to develop sweep width estimates for the environmental conditions experienced.

Of the 11 visual detection parameters investigated, visibility, wind speed, swell height, cloud cover, search unit type, target type and color, sun's elevation, and time on task were determined to have a significant effect on sweep width. A more rapid degradation of sweep width was found for deteriorating environmental conditions than is now predicted by the National Search and Rescue Manual.

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A

METRIC CONVERSION FACTORS

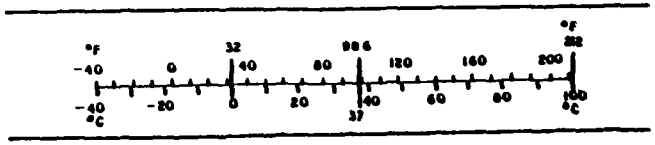
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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EXECUTIVE SUMMARY

INTRODUCTION

This report analyzes the cumulative results of four 1978-1979 Coast Guard Research and Development Center visual detection experiments. These experiments are the first in a series to be used for reevaluating and revising the National Search and Rescue Manual (SAR Manual) (Reference 1) visual search sweep width tables (with the intent of improving their accuracy and determining whether additional parameters may significantly influence sweep width). From the visual search data base, a sophisticated search and rescue unit (SRU) detection performance model is being developed for the Coast Guard's computer-assisted search planning (CASP) system.

In the experiments 82/95-foot cutters, 41/44-foot boats, helicopters, and fixed wing aircraft searched for 16-foot open boats and life rafts. The influence of the following search parameters upon sweep width* was investigated:

1. SRU type
2. Target type and size
3. Visibility
4. Altitude
5. Search speed
6. Time on task
7. Target color
8. Wind speed
9. Sun's elevation
10. Swell height
11. Cloud cover

*Sweep width is a single number representation of the probability of detection P(x) versus lateral range relationship currently used by search planners. Sweep width is a mathematically expressed measure of detection capability which is influenced by target characteristics, search unit characteristics, and weather conditions.

RESULTS

Table 1 indicates those parameters that were found to have a significant influence on sweep width (W). These parameters are listed below in decreasing order of influence per category (over the range of environmental, SRU and target conditions/characteristics evaluated):

1. Environmental Conditions
   (a) Wind speed and swell height*
   (b) Visibility
   (c) Cloud cover
   (d) Elevation of the sun
2. Search Unit Characteristics
   (a) Time on task (except fixed wing aircraft)
   (b) SRU type
   (c) Search speed (fixed wing aircraft only)
3. Target Characteristics
   (a) Target type and size
   (b) Target color

Aircraft altitude (500 or 1000 feet) was the only explanatory parameter not found to influence P(x).

Table 2 presents sweep width calculations based on data for all combinations of SRU and target type evaluated, and for environmental conditions that were represented in all data bases.

CONCLUSIONS

1. Wind Speed and Swell Height

Experimental results indicated that all increases in wind speed levels result in a decrease in the sweep width. This contradicts

*Wind speed and swell height were highly correlated during these experiments and thus their collective influence is presented.

TABLE 1. SIGNIFICANCE OF EXPLANATORY VARIABLES IN EXPLAINING VARIABILITY IN SWEEP WIDTH

SRU and Target Types		Significance of Explanatory Variables Evaluated (Yes/No)									
SRU TYPE	TARGET TYPE	SEARCH SPEED	VISIBILITY	WIND SPEED	SWELL HEIGHT	CLOUD COVER	ELEVATION OF SUN	TIME ON TASK	SRU TYPE	ALTITUDE (AIRCRAFT ONLY)	TARGET COLOR
41'/44' boats and 82'/95' cutters	16' boats	No	No	Yes	Yes	Yes	No	Yes	Yes	-	Yes
41'/44' boats and 82'/95' cutters	Life rafts	No	Yes	Yes	Yes	Yes	No	Yes	Yes	-	Yes
Fixed wing aircraft	16' boats	Yes	Yes	Yes	No	Yes	No	No	-	*	Yes
Helicopters	16' boats	No	Yes	Yes	No	Yes	No	Yes	-	*	Yes
Fixed wing aircraft and helicopters	Life rafts	*	Yes	Yes	Yes	No	Yes	No	No	No	Yes

*For aircraft, search speed and altitude were fixed during life raft and 16-foot boat experiments, respectively. Therefore, the significance of these parameters is evaluated in terms of the respective targets.

TABLE 2A. SWEEP WIDTH* CALCULATIONS FOR EXCELLENT CONDITIONS

SEARCH UNITS	TARGETS				
	LIFE RAFT			16-FOOT BOAT	
	ORANGE		BLACK	WHITE	BLUE
	with canopy	without canopy			
Cutters	6.1	5.7	5.2	5.7	4.9
Boats	4.6	4.1	3.6	4.7	3.7
Helicopters	3.7	3.2	2.7	5.6	5.0
Fixed wing aircraft	3.7	3.2	2.7	4.2	3.7

Excellent conditions: wind speed - 5 knots, swell height - 0 feet, cloud cover - 0 percent, visibility - 15 nm.

TABLE 2B. SWEEP WIDTH* CALCULATIONS FOR FAIR CONDITIONS

SEARCH UNITS	TARGETS				
	LIFE RAFT			16-FOOT BOAT	
	ORANGE		BLACK	WHITE	BLUE
	with canopy	without canopy			
Cutters	3.1	2.6	2.2	2.8	2.0
Boats	1.7	1.3	1.0	1.8	1.1
Helicopters	2.1	1.7	1.3	3.2	2.6
Fixed wing aircraft	2.1	1.7	1.3	2.3	2.0

Fair conditions: wind speed - 10 knots, swell height - 2 feet, cloud cover - 100 percent, visibility - 15 nm.

*Sweep width is given in nautical miles.

the SAR Manual sweep width tables for wind speeds of 10 knots or less. Swell height was highly correlated to wind speed during the experiments and therefore cannot be assessed independently of wind speed.

2. Visibility

Increases in visibility had a minimal effect on improving sweep width when visibility was greater than about twice the sweep width. This is in contrast to the SAR Manual sweep width tables which predict continual increases in sweep width out to 50 nautical miles visibility.

3. Cloud Cover

Sweep width was not as greatly affected by increasing cloud cover as predicted by the SAR Manual.

4. Elevation of the Sun

Preliminary results showed that search effectiveness rapidly degrades during twilight. Additional data is required to better quantify these effects.

5. Time on Task

Sweep width was significantly reduced as time on task increased for helicopters and surface vessels searching for 16-foot boats and for surface vessels searching for life rafts. The human factors which contributed to this reduction will be addressed in a separate report.

6. SRU Type

Cutters consistently outperformed 41/44-foot boats for all target types and environmental conditions. Under excellent conditions, their sweep widths were 20 to 45 percent better than boats; under fair conditions, they were 55 to 120 percent better.

When searching for 16-foot boats, helicopters at 500 feet altitude outperformed fixed wing aircraft at 1000 feet altitude. When altitude was varied between 500 and 1000 feet for life raft searches, helicopters and fixed wing aircraft performance did not differ significantly. The data base is smaller for life rafts than for 16-foot boats, so SRU type differences may be obscured by statistical fluctuations.

7. Search Speed

Cutters, boats, and helicopters can search at maximum speed allowed by environmental conditions without reducing sweep width. Although increasing search speed reduced sweep width for fixed wing aircraft, the sweep rate (sweep width times search speed) remained essentially constant. Therefore, fixed wing aircraft search speed should be based upon other considerations such as endurance, comfort, etc.

8. Target Type and Color

Larger targets, those with silhouettes which float higher out of the water, were sighted at farther distances than those with low freeboards. As well as target type, color was found to influence the detectability of both 16-foot boat and life raft targets, with the lighter, brighter colored targets being more detectable than darker colored targets. As an example, Table 2 lists the SRU sweep width for the target types and colors tested under excellent and fair environmental conditions.

9. Aircraft Altitude

The probability of detecting life rafts was not significantly different for aircraft searching at 500 feet or at 1000 feet altitude. (As noted in 6. above, search altitude was not varied for 16-foot boats in order to better investigate search speed effects.) Collection of additional data over a greater range of altitudes would serve to quantify the influence, if any, of altitude on $P(x)$.

The following conclusions were also drawn:

1. Under poor environmental conditions, a very rapid degradation in P(x) with lateral range was observed. When these results are coupled with representative navigation inaccuracies, the assumption of uniform coverage of the search area that is inherent in the present SAR Manual Probability of Detection versus coverage factor model is apparently not appropriate and, therefore, the applicability of this model, particularly to circumstances where navigation inaccuracies of the SRUs are the same or greater than the sweep width, is in question. A forthcoming report will compare experimental results with the SAR Manual POD versus coverage factor model and recommend changes, if warranted.

2. After four experiments, it seems clear that collection of substantial data for poor environmental conditions is unlikely. Therefore, it would appear advisable to expend some analytical effort to develop predictions of detection performance for these marginal environmental conditions, and make further attempts to collect empirical data for these conditions as the opportunity arises.

RECOMMENDATIONS

In order to develop an accurate computerized search planning model and to make comprehensive recommendations on changes to the National Search and Rescue Manual visual sweep width tables, additional experiments should be conducted with the following types of SAR targets:

1. Life rafts
2. Persons in the water (PIW)
3. 30-foot boats
4. 45-foot boats

The experiments should be conducted over a wide range of environmental conditions so that the results have general application.

CHAPTER 1
INTRODUCTION

1.0 SCOPE

This report describes the conduct and analysis of four Coast Guard Research and Development (R&D) Center visual detection experiments conducted during 1978 and 1979. These are the first in a series of experiments designed to quantify search and rescue unit (SRU) performance to develop an accurate visual detection model for the Coast Guard's computer-assisted search planning (CASP) system, and to improve upon the search planning guidance provided by the National Search and Rescue Manual (SAR Manual) (Reference 1). This report includes the data from and builds upon the experimental methods and results of Edwards et al. (Reference 2) which documented preliminary results of the initial R&D Center experiment involving visual detection of white 16-foot boats.

1.1 Background

A key ingredient to effective search and rescue (SAR) planning is an accurate prediction of the detection performance of various SRUs for conditions existing in the search area. Overestimating detection performance may result in premature termination of the search of a particular area, while underestimating detection performance may result in the search of a particular area being extended unnecessarily (thereby delaying search of other areas). In either case, SAR resources would not be utilized in an efficient manner.

1.2 Sweep Width

The primary performance measure currently utilized by SAR mission coordinators to plan searches is sweep width (W). Sweep width is a single number summation of a more complex range detection probability relationship. Mathematically,

$$\text{Sweep Width } (W) = \int_{-\infty}^{\infty} P(x)dx,$$

where

x = lateral range or closest point of approach to targets of opportunity (see Figure 1-1) and

P(x) = probability of detection at lateral range x.

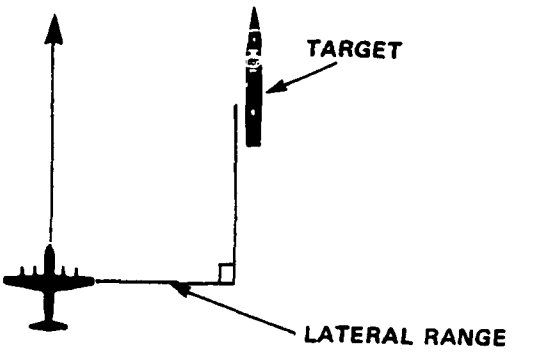


FIGURE 1-1. DEFINITION OF LATERAL RANGE

Figure 1-2 shows a typical P(x) curve as a function of lateral range. In Figure 1-2, (x) is the lateral range of detection opportunities.

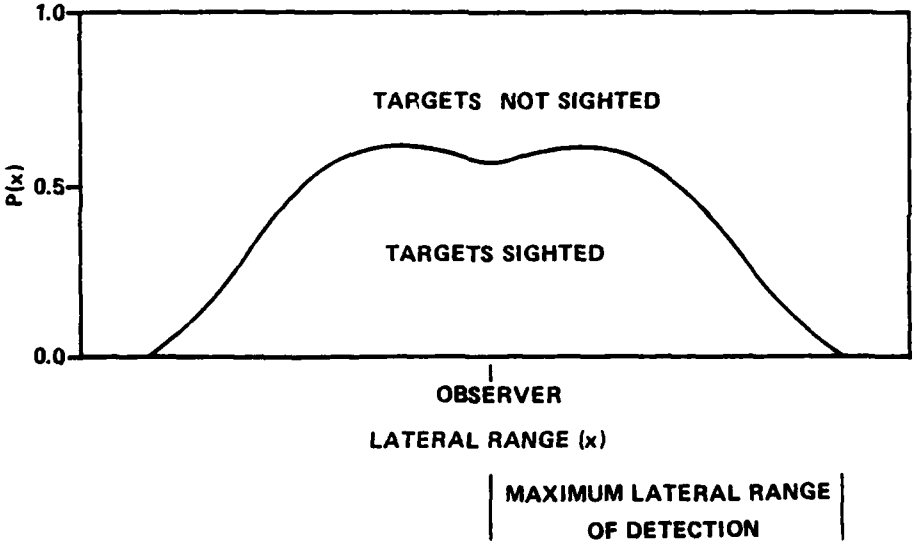


FIGURE 1-2. RELATIONSHIP OF TARGETS SIGHTED TO TARGETS NOT SIGHTED

Conceptually, sweep width is the numerical value obtained by reducing the maximum detection distance of any given sweep so that scattered targets which may be detected beyond the limits of W are equal in number to those which may be missed within those limits. Figure 1-3 (A and B) graphically presents this concept of sweep width. The number of targets missed inside the sweep width distance is indicated by the shaded portion near the top middle of the rectangle (area A) while the number of targets sighted beyond the sweep width distance out to maximum detection range (R_D) is indicated by the shaded portion at each end of the rectangle (area B). Referring only to the shaded areas, when the number of targets missed equals the number of targets sighted (area A = area B), sweep width is defined. A detailed mathematical development and explanation of sweep width can be found in Search and Screening (Reference 3).

Present SAR Manual search effectiveness estimates use sweep width (W) and track spacing (S) to define a quantity called coverage factor (C), with $C = \frac{W}{S}$. Based upon the inverse cube law of detection (Reference 3), a relationship between the cumulative probability of detection (POD) for a search and C is defined. Appendix B shows the SAR Manual POD versus coverage factor curve. It is important to appreciate the difference between P(x) and POD. P(x) being the probability density function describing the probability on one sweep of detecting a target with a lateral range x from the searcher, while POD is the cumulative probability that a randomly distributed target in a given search area will be detected at least once during a uniform search of the area.

1.3 Parameters

From literature research, 24 parameters have been identified as having a potential influence on sweep width. These parameters can be divided into three categories:

1. Primary independent measurable parameters (11 parameters),
2. Interdependent human factors (seven parameters), and
3. Secondary parameters (six parameters).

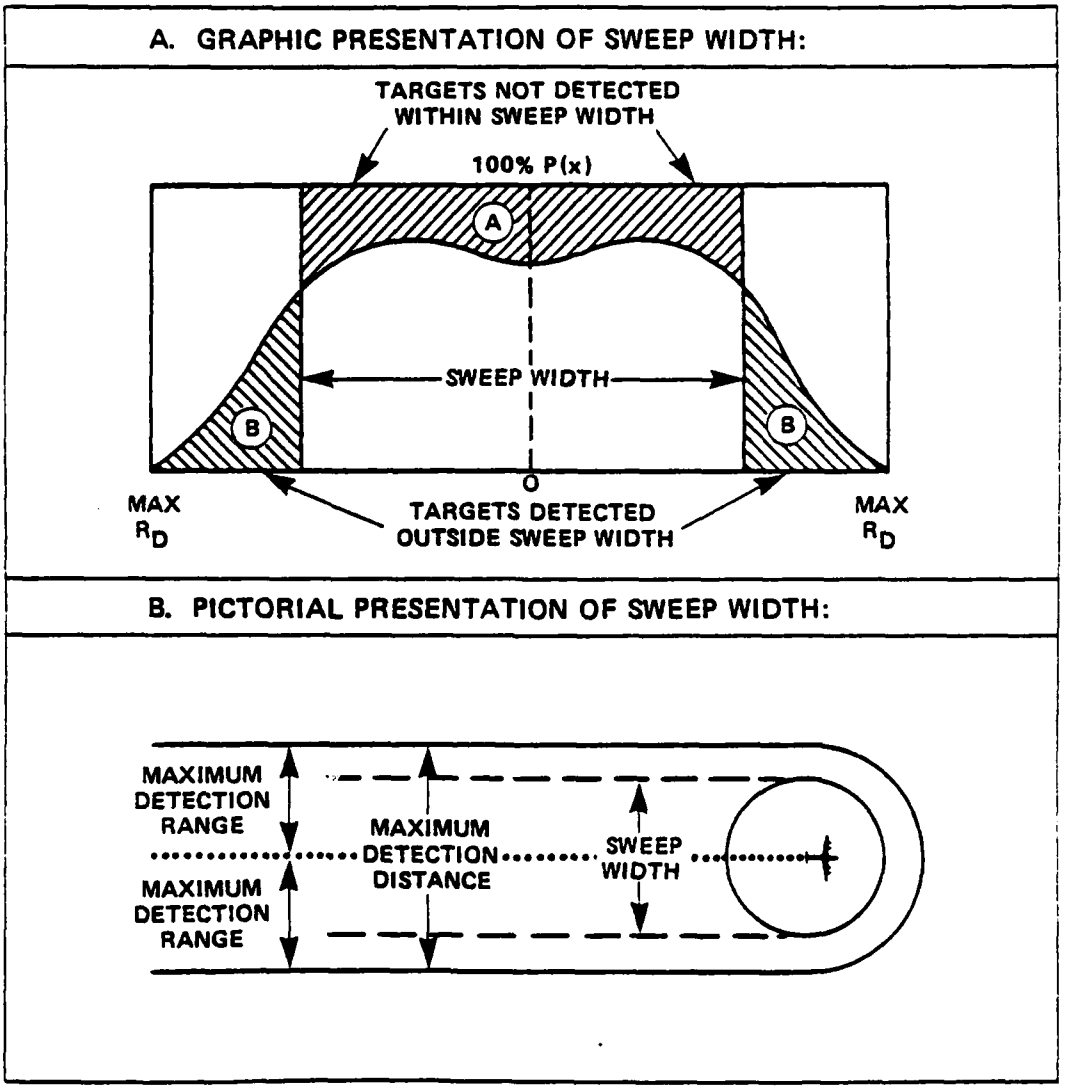


FIGURE 1-3. GRAPHIC AND PICTORIAL PRESENTATION OF SWEEP WIDTH

1.3.1 Primary Variables. Primary variables are those intended to be investigated during the planned series of experiments. They are:

1. SRU type
2. Target type and size
3. Visibility
4. Altitude
5. Search speed
6. Time on task
7. Target color
8. Wind speed
9. Sun's elevation
10. Swell height
11. Cloud cover

1.3.2 Interdependent Human Factors. Quality lookout performance is essential for the success of a visual search mission. Data concerning human factors effects on lookout performance was collected during these experiments and will be reported on separately. These factors, which are dependent upon type of search unit, time on task, wind, sea state, and Coast Guard policies, are:

1. Fatigue
2. Stress (noise, glare, vibration, temperature, motion, etc)
3. Visual acuity and perception
4. Training level
5. Experience level
6. Motivation level
7. Position of lookouts

1.3.3 Secondary Parameters. The six remaining variables are either a function of the search unit type, search incident, or are continually changing during the search operation. The parameters under consideration, but not as primary independent variables, are:

1. Number of lookouts
2. Target movement and aspect
3. Relative wind direction
4. Sun's relative bearing
5. Lookout briefings
6. Visual aids

1.4 Summary

Few investigators have collected visual search data, and the tests conducted have omitted potentially significant sweep width variables. Of the 24 variables listed above, only five are used at present and the magnitude of their influence is uncertain. Thus, World War II visual search techniques, which have been updated once from sighting report data collected 23 years ago (Reference 4), are utilized in SAR planning. The Reference 4 evaluation which updated the Reference 1 sweep width tables (visual detection model), did not include such essentials as search unit type, time on task, and target-missed information, and no data was evaluated from surface search units. Also, the Reference 4 data was not gathered during a controlled experiment but was obtained from sighting reports from Coast Guard surface vessels and aircraft on various operational missions and exercises. Finally, the sweep width tables of Reference 1 do not include persons in the water, and all target boats 30 feet or less in length are lumped into one category.

The need for a reevaluation of the SAR Manual sweep width tables is apparent, both from the standpoint of improving their accuracy, as well as determining whether additional parameters not considered in the development of these tables may have a significant influence on sweep width. Thus, this series of experiments will determine those environmental, search unit, and target characteristics which influence the search performance of boats, cutters, helicopters, and fixed wing aircraft in detecting persons in the water, life rafts, and various sizes of boats. Using the significant parameters, statistically sound computerized and manual visual detection models will be develored from data collected. The experiments described in this report focused on the performance of these search units in detecting 16-foot open boats and life rafts.

1.5 Scope of Effort

Details concerning the level of effort and time frame required to plan, conduct, and analyze such experiments have been tabulated previously for the fall 1978 experiment. Readers interested in this information should refer to Sections 1.5 and 1.6 of Reference 2.

CHAPTER 2
THE EXPERIMENTS

2.0 GENERAL DESCRIPTION

2.1 Visual Detection Experiments

Numerous surface vessels and aircraft participated in the visual detection experiments conducted in Block Island Sound. A brief description of the characteristics of each type SRU and a list of the individual participants are given in Tables 2-1 and 2-2.

The search area was controlled; depending upon environmental conditions, it was varied from a minimum of 205 square kilometers (60 square nautical miles) to a maximum of 1030 square kilometers (300 square nautical miles). The center of the search area, the direction of its major axis, and the area size are shown in Figure 2-1 along with locations of microwave ranging system (MRS) tracking stations used during the experiments.

A total of four experiments are represented in the data base. Table 2-3 provides the salient characteristics of each experiment. The vast majority of the data was acquired during the three experiments in Block Island Sound. The data collected during experiment No. 2 was an "add-on" to a leeway drift experiment, with drifting rafts providing visual targets of opportunity for an HC-130 aircraft.

In order to make maximum use of resources (aircraft required a much lower target density than surface craft because of higher search speeds), surface craft and aircraft were scheduled on different days. On surface craft days, two cutters and two boats conducted searches; on aircraft days a maximum of two helicopters (HH-3F and HH-52A) and two fixed wing aircraft (HC-130 and HU-16E) conducted searches.

TABLE 2-1. SEARCH UNIT CHARACTERISTICS

SRU TYPE	CREW SIZE	MAX SPEED (knots)	NAVIGATION EQUIPMENT	HEIGHT OF EYE (feet)
SAR boats				
41 ft	3	20	DF[+1], Radar, Fathometer	10
44 ft	3	10	DF[+1], Radar, Fathometer	10
Cutters				
82 ft	8	18	LORAN A or C, Radar, DF[+1], Fathometer	25
95 ft	12	15	LORAN A or C, Radar, DF[+1], Fathometer	20
Helicopters				
HH-52A	3	90	TACAN, LORAN C[1]	--
HH-3F	4	115	TACAN, LORAN A, Doppler Computer, Radar	--
Fixed wing aircraft				
HU-16E	5	145	TACAN, Radar, LORAN A or C	--
HC-130	9	300	TACAN, Radar, LORAN A, INS*	--

+ DF -- Direction Finder.
*INS -- Inertial Navigation System.
1 -- Not used in experiments.

TABLE 2-2. PARTICIPATING UNITS/FACILITIES IN EXERCISES

CG Light Station Montauk, NY
CG Light Station Race Rock, New London, CT
CG Light Station Watch Hill, RI
Naval Underwater Systems Center (NUSC) FORACS Facility, Fishers Island, NY

CG Air Station Brooklyn, NY: CG 1442, CG 1368, CG 1424, CG 1391, CG 1410, CG 1388, CG 1384 (HH 52A)
CG Air Station Cape Cod, Otis AFB, MA: CG 1473, CG 1479, CG 1484 (HH 3F); CG 7254, CG 7250, CG 1293, CG 7213, CG 7214, CG 1016 (HU-16E)
CG Air Station Clearwater, FL: CG 1351, CG 1340 (HC-130B)
CG Air Station Elizabeth City, NC: CG 1340, CG 1347, CG 1344, CG 1346, CG 1341 (HC-130B); CG 1504 (HC-130H)

CGC Cape Fairweather (WPB 95314), New London, CT
CGC Cape George (WPB 95306), Falmouth, MA
CGC Cape Horn (WPB 95322), Woods Hole, MA
CGC Point Bonita (WPB 82347), Falmouth, MA
CGC Point Jackson (WPB 82378), Woods Hole, MA
CGC Point Knoll (WPB 82367), New London, CT
CGC Point Turner (WPB 82365), Newport, RI
CGC Point Wells (WPB 82343), Montauk, NY

CG Station Block Island, RI: CG 41441, CG 44349
CG Station Montauk, NY: CG 41342, CG 44348
CG Station New London, CT: CG 41413, CG 41337, CG 41350
CG Station Point Judith, Narragansett, RI: CG 41385, CG 44352, CG 44321, CG 44349

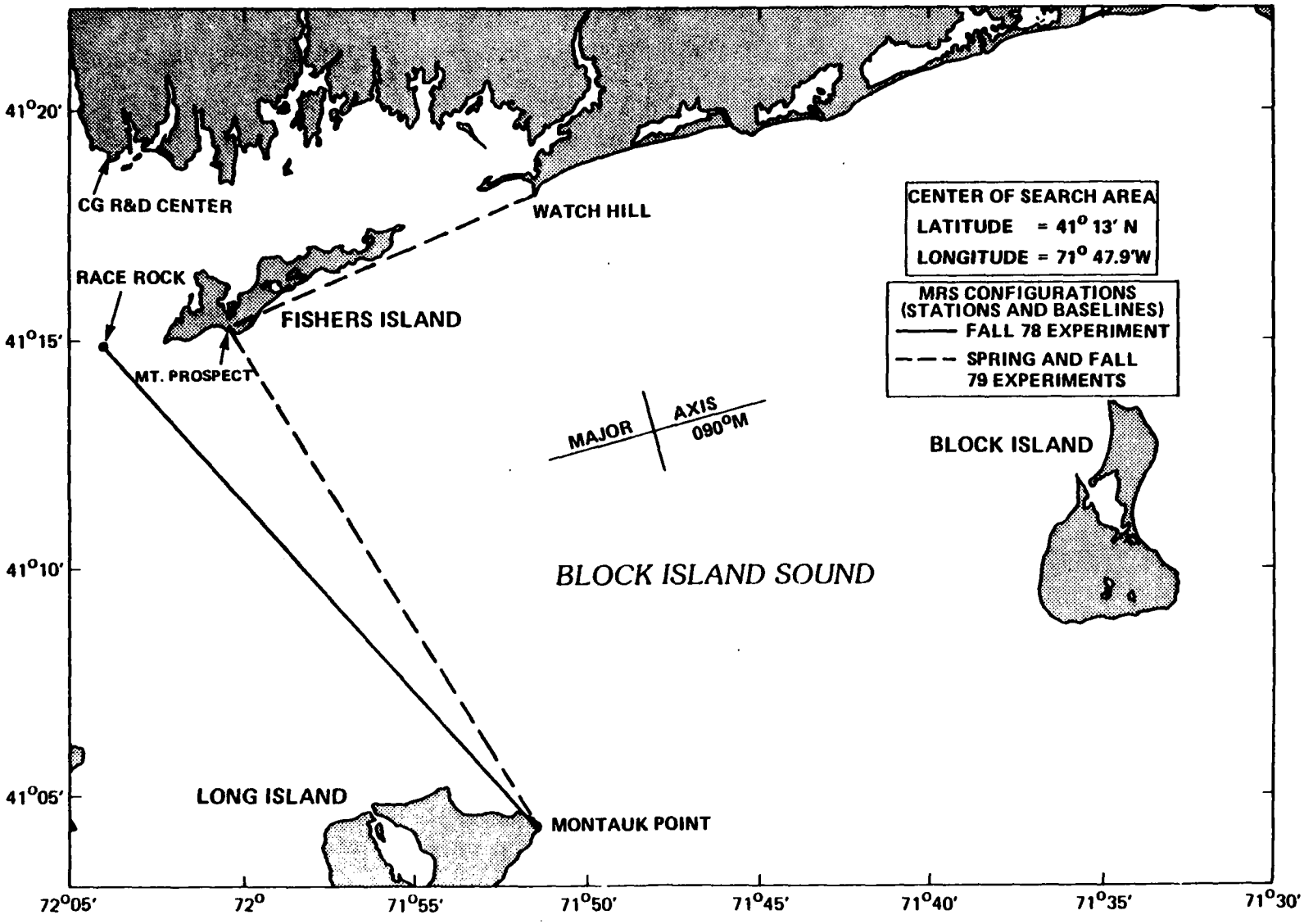


FIGURE 2-1. SEARCH AREA AND MRS CONFIGURATION

TABLE 2-3. DESCRIPTION OF INDIVIDUAL EXPERIMENTS

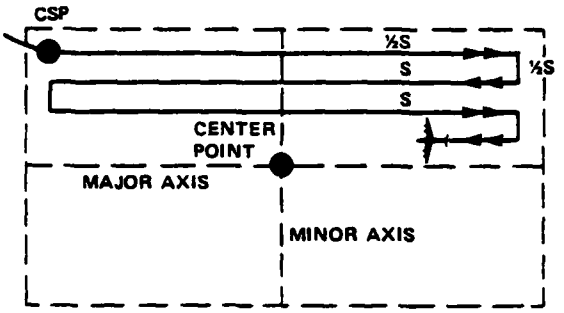
EXPERIMENT NO.	INCLUSIVE DATES	LOCATION	TARGET TYPES	TOTAL DETECTION OPPORTUNITIES
1	11 Sept - 6 Oct 1978	Block Island Sound	White 16-foot boats	695
2	26 - 31 Jan 1979	Atlantic Ocean off Florida Coast	Life rafts	12
3	16 April - 22 May 1979	Block Island Sound	16-foot boats; life rafts	961
4	17 Sept - 25 Oct 1979	Block Island Sound	16-foot boats; life rafts	566

Appropriate time separation between surface units and altitude separation between helicopters and fixed wing aircraft were provided. Because of equipment failure, actual SAR missions and other commitments, not all of the search units were available on some days during the experiment.

2.2 Search Tracks and Target Placement

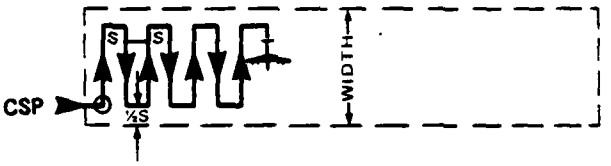
Search unit tracks were laid out in the same manner as they would be for actual SAR missions. Two basic search patterns (see sketches 1 and 2) were utilized: parallel and creeping line (Reference 1). In order to make best use of onboard navigational equipment (see sketches 3 and 4), some units slightly altered the basic patterns.

2.2.1 Parallel Search. Search legs were parallel to the direction of the major axis of the search area and were separated by a specified track spacing. Commence search points (CSP) and outer search legs were one-half the track spacing (S) inside the perimeter of the search area.



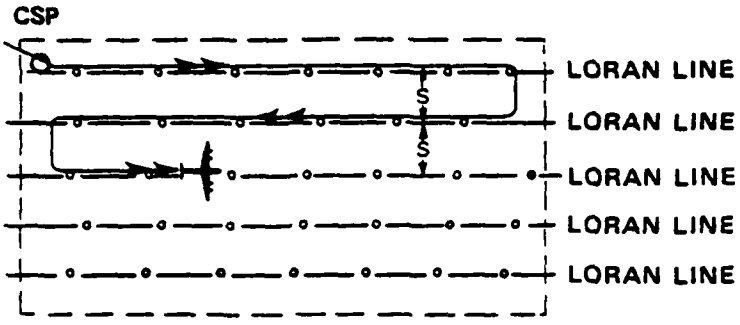
SKETCH 1. PARALLEL SEARCH PATTERN

2.2.2 Creeping Line Search. Search legs were perpendicular to the direction of the major axis of the search area and were separated by a specified track spacing. Start points and outer search legs were one-half the track spacing inside the perimeter of the search area.



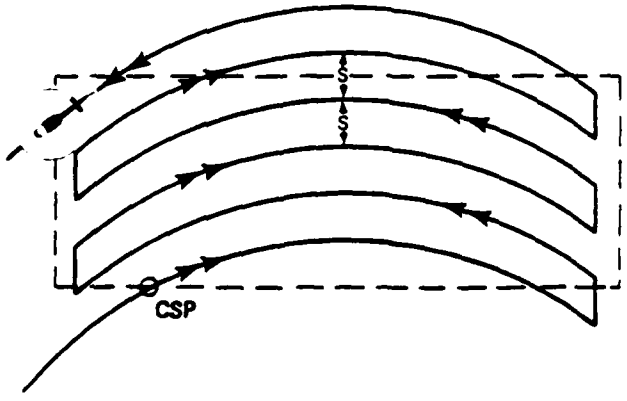
SKETCH 2. CREEPING LINE SEARCH PATTERN

2.2.3 Cutters with LORAN C (HU-16E with LORAN A or C). The two basic search patterns were skewed with respect to the major axis so that the cutters could follow LORAN C lines, and the HU-16E aircraft could follow LORAN A or C lines.



SKETCH 3. LORAN SEARCH PATTERN

2.2.4 HH-52A Helicopters with TACAN. The two basic search patterns were skewed so that the HH-52A could navigate along arcs of constant range from the Norwich TACAN station (modified parallel search) and from the Hampton TACAN station (modified creeping line search). TACAN is a distance measuring navigation net and was the only means of navigation available for an HH-52A search.



SKETCH 4. TACAN SEARCH PATTERN

2.2.5 Track Spacing and Target Placement. In all cases, prior to the exercise, track spacing had been estimated for "good" environmental conditions (unlimited visibility, low wind speed, low cloud cover) and "poor" environmental conditions (low visibility, high wind speed, high cloud cover). When appropriate, changes in track spacing were made by the On-Scene Commander (OSC). Track spacing of 3 to 5 miles was used for good conditions, and track

spacing of about 2 miles was used for poor conditions. Targets (either 16-foot open boats or life rafts) were positioned at predetermined locations by the monitoring vessel. Each day, a microwave ranging system (MRS) was utilized to accurately determine the initial location of anchored targets. Additionally, at the end of each search day, target locations were again checked to ensure that the targets had remained stationary. On some occasions the end-of-day checks indicated that targets had drifted from their initial positions. These targets were then eliminated from the data base since their positions during the search could not be determined to within 0.1 nm accuracy.

The number and positions of the targets relative to planned search tracks were designed to provide about six detection opportunities per hour. This number was a compromise between the desire to obtain as much data as possible in a given time interval and not biasing the results of the experiment by overloading the lookouts.

2.2.6 Search Conduct. When possible, searches were conducted in the same manner as actual SAR missions. Twenty-four hours prior to each search, the Coast Guard R&D Center released a SAR exercise (SAREX) message to each SRU, providing it with the detailed information necessary to prepare for and conduct the desired visual searches. Each morning, targets were towed to the search area and positioned by the monitoring vessel (which also served as a command post for the OSC). After the targets were positioned, the searchers proceeded to designated start positions and initiated search procedures as described in the SAREX message. Each SRU had at least one observer onboard. It was the observer's task to record sighting information, ensure that the search plan was being adhered to (e.g., see that searchers did not deviate from the search track to classify a sighting or did not go through the search area before or between search runs), note any artificial influences which might bias the test results, gather human factors information, and record any suggestions for improving the experiment.

Visibility, wave height, wind speed, and cloud cover were recorded at several different times each day by the OSC and observers.

For each target sighting, the following data was collected by the obs ver onboard each search unit:

1. Time target was sighted
2. Approximate range and relative bearing to target
3. Relative bearing of sun
4. Searcher course, speed, and altitude
5. Target color
6. Position of lookout making sighting

2.3 Reconstruction

Throughout each experiment, a microwave ranging system (MRS) was used to locate the position of SRUs and targets. A master transmitter unit was used in conjunction with up to two secondary units to obtain fixes on the position of each SRU as it searched. The OSC's monitoring vessel was also tracked so that when targets were set their positions could be marked. Each search unit was equipped with a mobile responder to re-transmit signals received from the master transmitter.

Location of the master and secondary units varied from the 1978 experiment to the 1979 experiments, with each subsequent configuration providing better tracking capability for the system over a larger area. In the fall 1978 experiment, the master unit was located at Race Rock light station with a single secondary unit at Montauk Point light station, forming one "baseline". The system was upgraded for the spring 1979 experiment by the addition of another secondary unit at Watch Hill light station and moving the master unit to Mt. Prospect on Fishers Island. During the fall 1979 experiment, the MRS configuration was the same as during the spring 1979 experiment, but higher gain antennas were used to increase the area coverage. Preliminary testing of a desk top calculator interface to control MRS operation and automatically reconstruct search tracks has been conducted and will be available for future experiments.

Figure 2-1 shows the MRS geometries utilized during each of the three experiments.

Figure 2-2 illustrates the MRS operation as described below:

1. The master unit transmitted a pulse at 5400-5600 MHz which triggered the responder on a particular mobile unit.

2. The responder in turn transmitted a pulse which triggered a secondary unit and was also received at the master unit.

3. The secondary unit transmitted a pulse which was received back at the master unit.

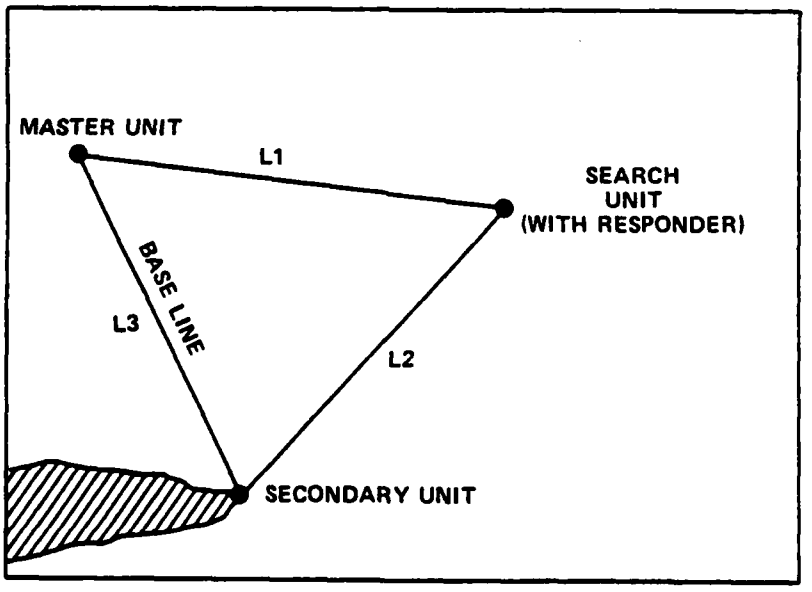


FIGURE 2-2. MICROWAVE RANGING SYSTEM

The master unit measured two time delays: one corresponding to twice the distance from its location to the responder (L_1), and one corresponding to the loop range ($L_1+L_2+L_3$). The output of the master unit was a hard copy of time, distance from the master unit to the SRU, and half loop range. With ideal geometries, the manufacturer advertises range accuracies with the MRS within ±3 meters. With the addition of a second baseline for the spring 1979 experiment, MRS positions could be checked against both baselines and ambiguous solutions could be resolved, thus the potential for errors and inaccuracies was reduced.

The monitor boat, which positioned targets, was fitted with a responder so that the MRS could record the position of targets at the beginning and end of each experiment day. SRUs (except HC-130) were fitted with responders so that their positions could be monitored by the ranging system. The position of surface SRUs was recorded every three to five minutes and the position of aircraft SRUs was recorded every minute in order to provide track information for reconstruction. Conservatively, the upper bound of errors in lateral range using this system was ±0.1 nautical mile.

LORAN A and C were also used for reconstruction of SRU tracks when microwave ranging information was unavailable or incomplete. The Inertial Navigation System (INS) was used as an aid in reconstructing the HC-130 tracks. On side-looking airborne radar (SLAR) equipped HC-130 aircraft, the INS and SLAR information was used in conjunction to reconstruct search tracks.

On occasion, microwave ranging information was not available due to equipment failure or weather. On these occasions, the analyst used manual reconstruction when good navigation information was available. Manual reconstruction relied upon LORAN A, LORAN C, visual and radar fixes, SLAR recordings, INS positions, and dead reckoning. In some instances, the microwave ranging system provided time and direct range from the master unit to the SRU but did not provide half loop range. In these situations, the SRU could be located at successive times on arcs of circles centered at the master unit. Knowing the speed and desired track of the SRU, its track across these arcs could be reconstructed. Thus, for manual reconstruction, it is felt that

representative accuracies in lateral range were also ±0.1 nautical mile. Since two baselines and larger antennae were used with the MRS in the fall 1979 experiment, manual reconstruction was only necessary for HC-130 aircraft which did not have transponders onboard. While in some cases, lateral range inaccuracies may have exceeded 0.1 nautical mile, there is no reason to believe that any bias in lateral range determination existed. Thus, these inaccuracies would not cause a change in the best estimate of performance, but only contribute to a larger variance.

2.4 Navigation Error

Table 2-4 shows the mean maximum and minimum deviation from intended search tracks experienced by each SRU type during the spring 1979 experiment. Also included in the table are the type of trackline assigned to the units and the method of navigation which was used.

TABLE 2-4. MEAN MAXIMUM AND MINIMUM DEVIATION FROM TRACK BY UNIT TYPE AND NAVIGATION METHOD (SPRING, 1979 EXPERIMENT)

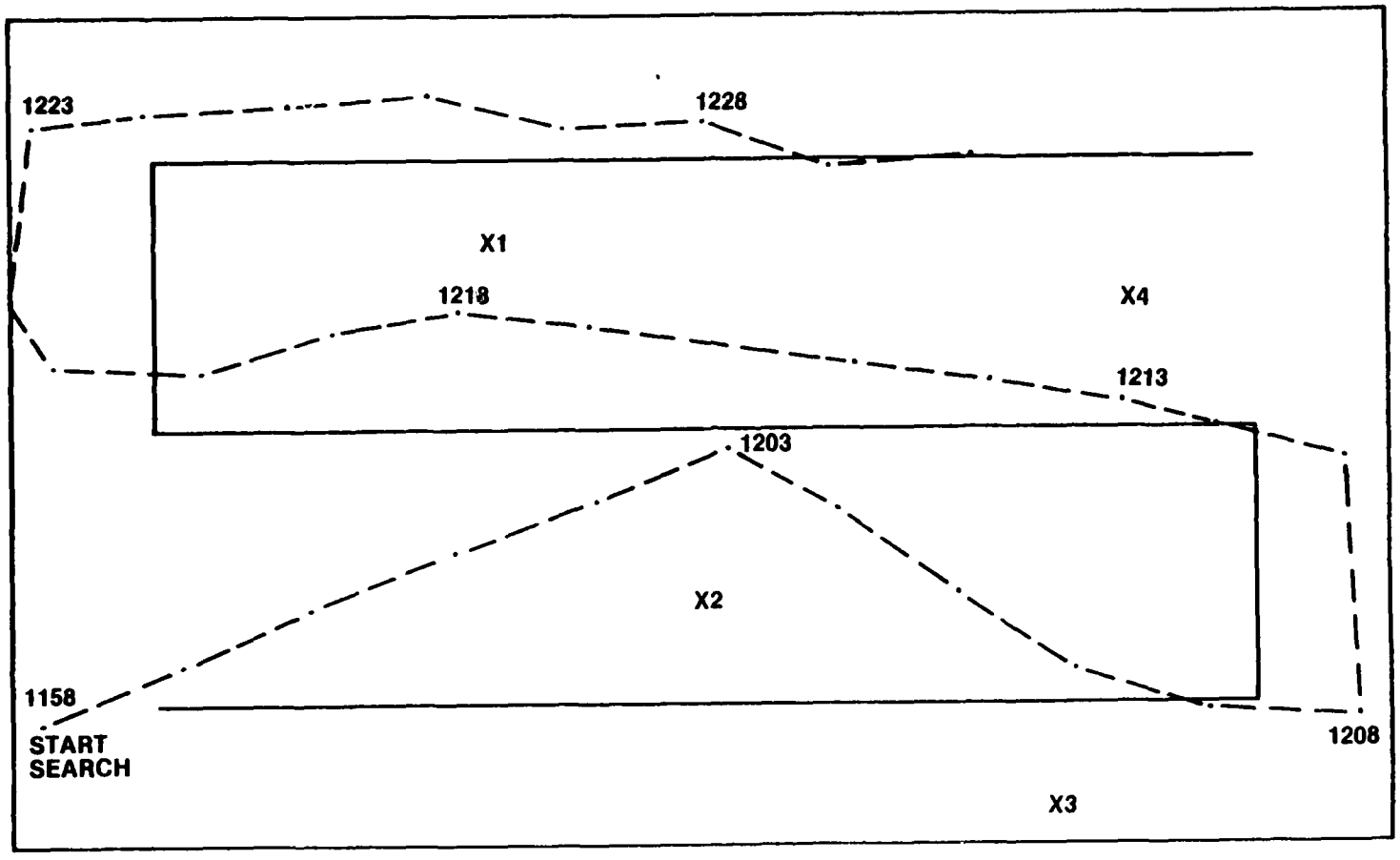
SRU TYPE	NAVIGATION METHOD	ASSIGNED TRACKLINE	MEAN MAX. DEVIATION (nm)	MEAN MIN. DEVIATION (nm)
82'/95' cutters	LORAN C	CSL, PSL	0.6	0.07
	DR/Radar	CS, PS	1.3	0.3
41'/44' boats	DR/Radar	CS, PS	1.9	0.36
Helicopters	TACAN	TACAN	1.9	0.2
	TACAN with Doppler Computer	CS, PS	1.8	0.31
	DR/Radar	CS, PS	1.0	0.25
Fixed wing aircraft	INS	PS	0.73	0.02
	LORAN A	PS	2.7	0.31

Table 2-4 shows that cutters equipped with LORAN C and C-130 aircraft equipped with INS tend to deviate from their assigned tracklines by smaller distances than SRUs using other methods of navigation. Also noteworthy is that helicopters using TACAN did no better at staying close to their assigned track than did 41-foot and 44-foot boats using simple dead reckoning, even when a Doppler computer was employed. Finally, HU-16 aircraft using LORAN A could not duplicate the performance of cutters using LORAN C in remaining near their assigned track, and seem to have done more poorly than all other units as well. It must be noted that for HU-16 and HC-130 aircraft, the test area was much smaller than their normally assigned open sea search areas (greater than 1000 nm^2). Because of the short search legs in the test area, LORAN navigation may be an inappropriate method due to the brief time available for "steadying up" on a course as illustrated in figure 2-3.

It should be emphasized that examining maximum and minimum deviation from assigned trackline is not necessarily an accurate overall indication of how well an SRU executes a search pattern, and that no investigation of the effects which navigation errors have on search performance has been made. Such an investigation would best be done using computer simulation where varying amounts of navigation error could be introduced to SRUs executing standard search patterns. The simulated performance of each SRU would be governed by the P(x) versus lateral range curves generated in this report, yielding a quantitative relationship between navigation error and search performance.

2.5 Data Collection Techniques and Data Accuracy

Each SRU had at least one observer onboard at all times during the experiment. The major responsibility of the observer was to record all pertinent data for each target sighting; the time of day, estimated target range, and estimated relative bearing of the target were of critical importance. (Sighting time, relative bearing, and range estimates of targets were the prime parameters used to decide whether a sighting was a valid detection.)



NOTES:

1. **HU-16E SEARCHED FOR 16-FOOT BOAT TARGETS (1, 2, 3, 4) AT 1000 ft ALTITUDE AND 120 knot SEARCH SPEED USING 4 nm TRACK SPACING.**
2. **ENVIRONMENTAL CONDITIONS: VISIBILITY 4 nm, WIND SPEED 6 knots, CLOUD COVER 100%, SWELL HEIGHT 0 ft.**
3. **ACTUAL POD OF SEARCH WAS 50%: TARGETS 1 AND 4 WERE SIGHTED, 2 AND 3 WERE MISSED.**

FIGURE 2-3. ACTUAL AND INTENDED LORAN A SEARCH TRACKS FOR HU-16E (FIXED WING AIRCRAFT)

Accordingly, all SRUs synchronized watches with the OSC at commencement of the first search. This was especially critical for high speed search aircraft.

A daily record of all environmental data was maintained by the OSC and the observer on each SRU. Wind speed and direction were recorded using a hand-held anemometer onboard the OSC vessel and an installed anemometer or an estimate onboard the SRU. Wave height (swell), cloud cover, and visibility were estimated by the OSC and by the crew on each SRU.

2.6 Experiment Design Considerations

On each day of the experiment, up to four SRUs searched simultaneously and provided a number of replications for each set of environmental conditions encountered. Boats and cutters searched simultaneously on each surface craft search day, and both helicopters and fixed wing aircraft searched simultaneously on each aircraft search day. This procedure provided data for a direct comparison of different type search units under the same environmental conditions. All units were provided with the same information and similar search instructions so as not to bias exercise results in favor of any particular type SRU. Controllable factors such as search speed and search pattern (parallel search or creeping line search) were randomized in order to minimize bias due to unknown or unmeasurable factors. For example, to minimize the chance that any changes in performance attributed to a change in search speed would be caused by a change in some unknown factor, each SRU was assigned a high speed for one search and low speed for the other. The order in which these speeds were assigned was alternated between successive units. Additionally, search patterns were almost always changed between consecutive searches. Thus, a variety of search speeds for each pattern was obtained. Helicopter and boat crews were generally changed on successive days while fixed wing aircraft crews and cutters changed weekly so that performance would be indicative of SRU type rather than a specific crew.

2.7 Description of Experiment Conditions

2.7.1 Summary of Detection Opportunities. Table 2-5 provides a summary of the total SRU resources dedicated to this experiment in terms of search and mission hours. Search time is defined as the cumulative number of hours each SRU type spent searching only during the experiments. The total SRU mission time includes hours spent at and transitting to and from the test area except when engaged in other operational missions. Even though the total resource search hours spent on two years of experiments may seem extreme, they represent only 2% of the total hours (35,000) that Coast Guard units spent searching during FY 1979. The total number of detection opportunities is also given for each type of search unit.

TABLE 2-5. SUMMARY OF SRU RESOURCES

SRU TYPE	TARGET TYPE	TOTAL SEARCH TIME (HOURS)	TOTAL MISSION TIME (HOURS)	TOTAL NUMBER OF DETECTION OPPORTUNITIES
Boats	Boats	101.6	182.6	265
Boats	Rafts	73.7	128.8	158
Cutters	Boats	123.2	315.4	377
Cutters	Rafts	87.8	208.7	299
Helicopters	Boats	44.6	110.6	371
Helicopters	Rafts	28.5	67.6	164
Fixed wing aircraft	Boats	37.0	173.2	405
Fixed wing aircraft	Rafts	31.5	263.6	195

2.7.2 Range of Environmental Parameters. An effort was made to conduct these experiments under conditions representative of those experienced during actual SAR missions. Table 2-6 shows the range of environmental conditions that existed during these experiments and the percentage of FY 1979 SAR missions that are represented by these conditions. In general, the environmental conditions not represented in these experiments are the poorer conditions (visibility < 5 nautical miles, wind speeds > 20 knots and swell height > 4 feet). These conditions are not represented in the data base for two reasons:

1. Conditions in the search area at these times of year infrequently reach these extremes, and

2. degradation of conditions much beyond the values above would cause cancellation of the experiment for safety reasons and/or to prevent loss of or damage to the targets.

TABLE 2-6. RANGE OF EXPERIMENT ENVIRONMENTAL CONDITIONS

SRU TYPE	TARGET TYPE	RANGE OF ENVIRONMENTAL CONDITIONS*		
		VISIBILITY (nm)	WIND SPEED (knots)	SWELL HEIGHT (feet)
Surface Craft	Boats	3-20(91)	0-22(98)	0-4(93)
	Life rafts	3-18(91)	0-17(93)	0-2(77)
Aircraft	Boats	5-15(83)	0-20(97)	0-3(87)
	Life rafts	5-15(83)	0-30(99)	0-3(87)

*Numbers in parentheses indicate the percentage of FY 1979 SAR cases involving 16 to 25-foot targets that are represented by the range of environmental conditions experienced during the experiments.

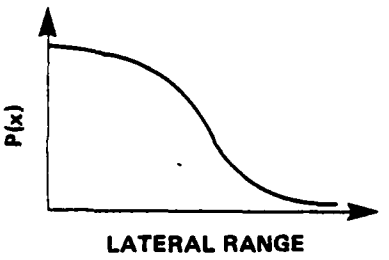
2.7.3 Time on Task. Time on task, which was previously called duration of search (Reference 2), is defined as the cumulative time that an SRU has been searching for the targets on a particular day. In cases where the search is terminated for a time and then re-commenced, the time-on-task clock is stopped upon completion of the initial search and re-started upon initiation of subsequent searches. Table 2-7 shows the time on task distribution for these experiments and compares these times to the FY 1979 SAR case search time distribution. For cutters, boats and helicopters, the time on task distribution for these experiments includes greater than 95% of all FY 1979 SAR cases. Since fixed wing aircraft (HU-16 and HC-130) would normally search larger areas than they were tested in, the time on task could be longer than that accumulated on an experiment day.

TABLE 2-7. SRU TIME ON TASK

SRU TYPE	DISTRIBUTION OF TIME ON TASK	
	HOURS	PERCENT OF FY 1979 SAR CASES REPRESENTED
Cutters	0 to 7	99
Boats	0 to 6	99
HH-3	0 to 3	98
HH-52	0 to 3	100
HU-16	0 to 3	86
HC-130	0 to 4	88

2.8 Analysis Approach

2.8.1 General. The primary objective of this analysis was to determine the significance of the independent variables and to develop sweep width estimates for each class of SRU (cutters, boats, helicopters, and fixed wing aircraft). Searches were conducted for 16-foot boats and life rafts at various search speeds under a variety of environmental conditions. Since sweep width is a single number representation of a more complex lateral range/probability of detection relationship, the key task of the analysis was to develop P(x) versus lateral range curves that accurately represent the characteristics of the experiment data. Experience has indicated that data of this type generally exhibits the classic stimulus-response (S-R) curve shown below.



The linear logistic (LOGODDs) model was selected as the best candidate for fitting binary S-R data. The LOGODDs model is a binary, multivariate regression technique useful to find the best quantitative relationship between independent variables (x_i) and a probability of interest, R (in this case the probability of detecting a target). The independent variables (x_i) can be continuous (e.g., range*, search speed, wind speed) or binary (e.g., day/night, black/orange, cutter/boat).

*In developing the P(x) versus lateral range curve, range is determined by the closest point of approach (CPA) that a SRU comes to a target of opportunity and is called lateral range. Since the distance between SRU and target is not affected by the 11 primary parameters being investigated, it is considered independent.

The equation which the model uses for target detection probability is:

$$R = \frac{1}{1 + e^{-\lambda}}$$

where

$$\lambda = a_0 + a_1x_1 + a_2x_2 + a_3x_3 \cdot \cdot \cdot$$

a_i = constants (determined by computer program) and

x_i = independent variable values

The LOGODDs model has the following advantages over other candidate models/techniques:

1. The model implicitly contains the assumption that $0 \leq R \leq 1.0$. A linear model does not, unless the assumption is added to the model (and then computation can become exceedingly difficult).

2. The model is analogous to normal-theory linear models. Thus, analysis of variance and regression implications can be drawn from the model.

3. The model can be used to observe the effects of several independent or interactive parameters be they continuous or discrete.

4. A regression technique is better than non-parametric hypothesis testing which does not yield quantitative relationship between the probability in question and values of the independent variables.

The primary disadvantages of the LOGODDs model are:

1. For the basic models, the dependent variable (R) must be a monotonic function of the independent variables.

2. The computational effort is substantial, requiring use of computer techniques.

The following sections describe raw data development, analysis conducted to ensure that the experiment data met the criteria for application of the LOGODDs model, and evaluations conducted to determine the goodness of fit of the experiment data to the LOGODDS model. Appendix A of Reference 2 provides a more detailed description of the LOGODDS model.

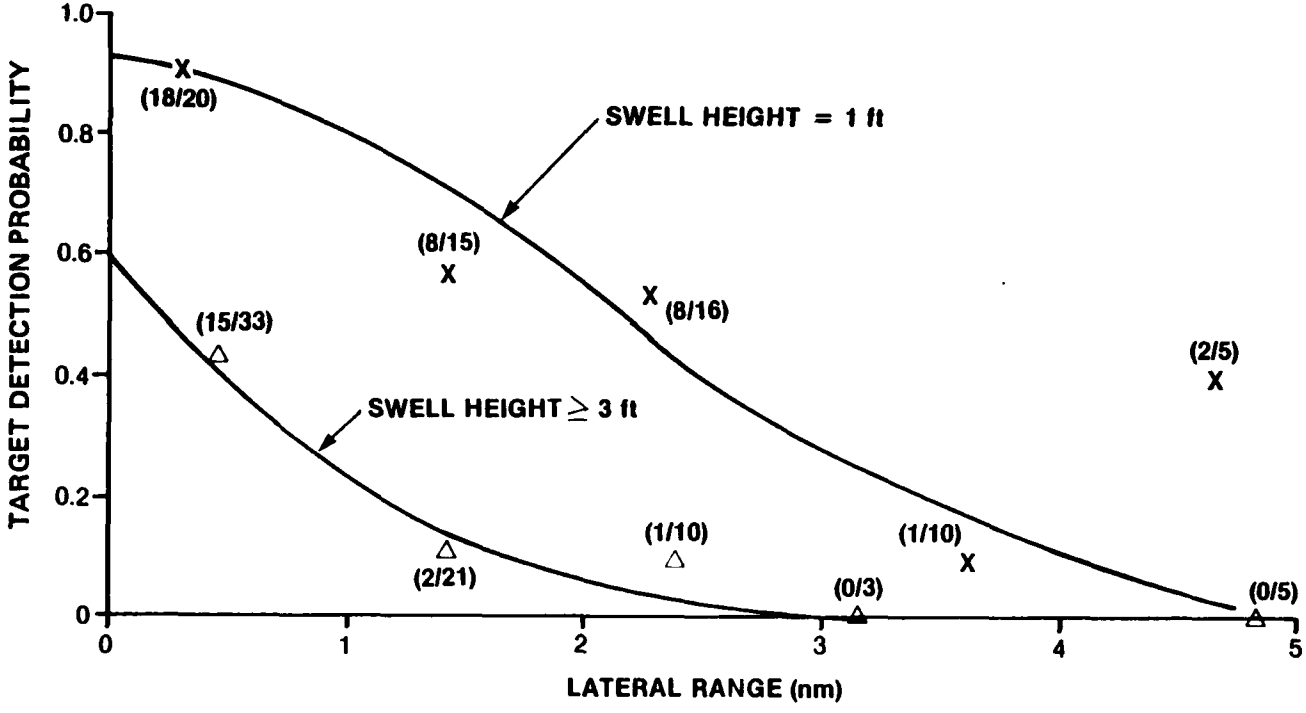
2.8.2 Development of Raw Data. Valid sightings of SAR targets were determined by comparison of sighting reports (maintained by observers onboard SRUs) to the reconstruction. Reconstruction provided searcher tracks annotated with time and target positions. For each sighting recorded, the time of the sighting, the estimated range and relative bearing were compared to actual target positions. If a sighting was determined to be a valid detection, the lateral range and values of other explanatory variables were recorded. The maximum lateral range of detection for each particular SRU type on the day in question was determined. The value was multiplied by 1.5, and became the criterion for evaluating targets of opportunity (maximum lateral range for that SRU type on the day tested). A multiplier of 1.5 was selected to provide data for values of lateral ranges with meaningful detection probabilities. Any target, whose lateral range was less than or equal to 1.5 times the maximum lateral range of a valid detection and was not recorded as a sighting, was determined to be a "miss". The lateral range and other explanatory variables for all targets of opportunity (detection or miss) were recorded in the same manner. Thus, a separate raw data file was developed for each search unit on a particular day that included all valid target sightings, and all misses that met the criterion above. Raw data for fall 1978 and winter, spring and fall 1979 experiments is included in Appendix A.

2.8.3 Aggregation of Data. The target detection data described in the previous section was aggregated separately for each SRU on each day. The performance data for all SRUs of a specific type (e.g., cutters) was then examined closely to determine whether it could be aggregated. For example, for each cutter on each day, the mean opportunity (lateral) range and average probability of detection were plotted. Lateral range curves were also developed using the raw data. This allowed the analyst to determine if, after correcting for different environmental or kinematic conditions, any cutter performed better or worse than other cutters. No significant differences between SRU units of the same type were noted for cutters, SAR boats, helicopters, or fixed wing aircraft.

The aggregated data for each type SRU was then used to develop empirical lateral range curves by binning the ratio of detections to opportunities for selected values of other explanatory parameters on lateral range. Figure 2-4 shows representative P(x) versus lateral range plots for cutters while searching for 16-foot boats for two environmental conditions. Note that the "best fit" curves for both cases demonstrate the classic S-R curve characteristic previously discussed.

A comparison between types of SRUs was made to determine whether the performance of different SRU types was affected similarly by the same changes in explanatory variables. (For example, did a 10-knot increase in wind speed result in similar reductions in detection performance for cutters and boats?) This comparison indicated that aggregation of cutter and boat data, and aggregation of helicopter and fixed wing aircraft data was appropriate.

2.8.4 LOGODDs Model, "Goodness of Fit". Once the computer runs have been conducted to develop the LOGODDs model for each unit type, a "goodness of fit" test was conducted to evaluate the model. Empirical data was binned by lateral range and environmental parameters to compare, in a qualitative sense, the goodness of fit of the model to experimental data. In all cases these results were satisfactory. Also, a LOGODDs subroutine performed a Chi-squared test of the goodness of fit of the LOGODDs models to empirical data.



NOTE: NUMBERS IN PARENTHESES ARE NO. OF DETECTIONS/NO. OF OPPORTUNITIES

FIGURE 2-4. EMPIRICAL DATA FOR CUTTERS SEARCHING FOR 16-FOOT BOATS

The results of these tests indicated that, as a group, the models with significant explanatory variables explained observed variation in P(x) at the 0.01 level of significance.

Additionally, Chi-squared tests were conducted to determine whether the LOGODDs models with only those variables determined to be significant could be improved upon by the addition of other explanatory variables. In no cases did Chi-squared tests at a 0.10 level of significance indicate that a significantly better model fit would result by the addition of other explanatory variables.

The goodness of fit of the model to the empirical data was also checked through an analysis of residuals (residuals are defined as the difference between the model prediction of P(x) and the outcome for each observation). Three different analyses of residuals were conducted.

1. The overall distribution of the residuals was checked for a near zero mean and normality.

2. Residuals were plotted with respect to each significant independent variable to check for systematic deviations from the models predictions.

3. Residuals were plotted with respect to predicted probabilities and aggregated to allow for analysis of variance.

CHAPTER 3
ANALYSIS RESULTS

3.0 INTRODUCTION

Surface craft detection performance for 16-foot boat and life raft targets is described in Sections 3.1 and 3.2, respectively. Aircraft detection performance for 16-foot boat and life raft targets is described in Sections 3.3 and 3.4, respectively. Section 3.5 compares surface craft and aircraft detection performance, while Section 3.6 compares the sweep width estimates derived from this experimental data with the sweep width tables of the National Search and Rescue Manual (Reference 1).

3.1 Surface Craft Detection of 16-Foot Boats

The experiments provided a total of 377 opportunities for cutters to detect 16-foot boats and 265 detection opportunities for 41/44-foot boats. The variability in P(x) was explained at a 0.01 level of significance by a combination of the following variables:

1. Lateral range
2. Swell height
3. Time on task
4. Wind speed
5. Search unit type (cutter or boat)
6. Cloud cover
7. Target color

Lateral range was the single most important parameter in explaining variability in target detection probability. As Figure 3-1 shows, for lateral ranges greater than 3 nautical miles, about one target in 10 was detected with no targets detected outside 5.3 nautical miles. In contrast, when aggregated over all environmental conditions, P(x) increased to 0.7 for lateral ranges less than 1 nautical mile.

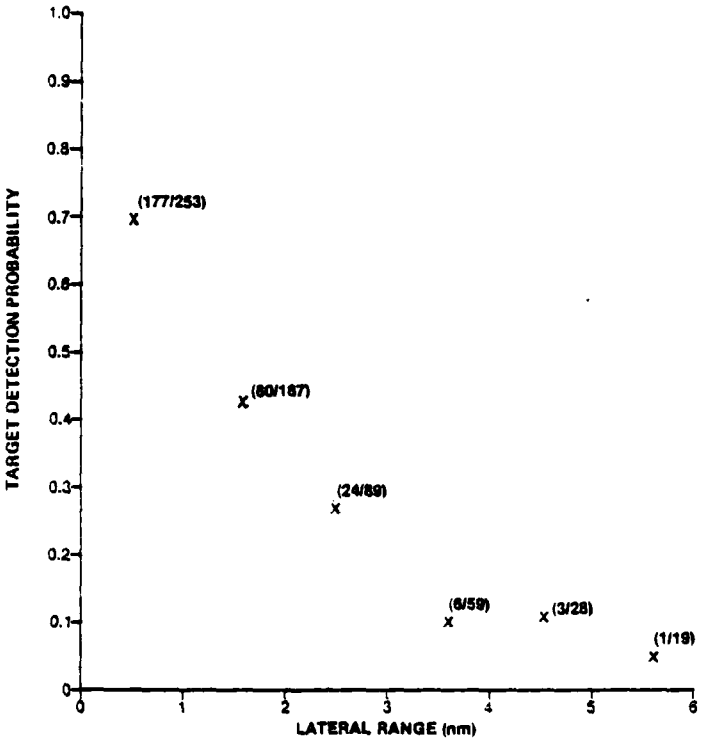


FIGURE 3-1. ACTUAL P(x) VERSUS LATERAL RANGE FOR SURFACE CRAFT SEARCHING FOR 16-FOOT BOATS

Figure 3-2 shows a predicted probability of detection versus lateral range curve for the following baseline case:

SRU type:	82/95-foot cutter
Target type:	16-foot white boat
Swell height:	0 feet
Wind speed:	5 knots
Cloud cover:	0 percent
Time on task:	0 hours

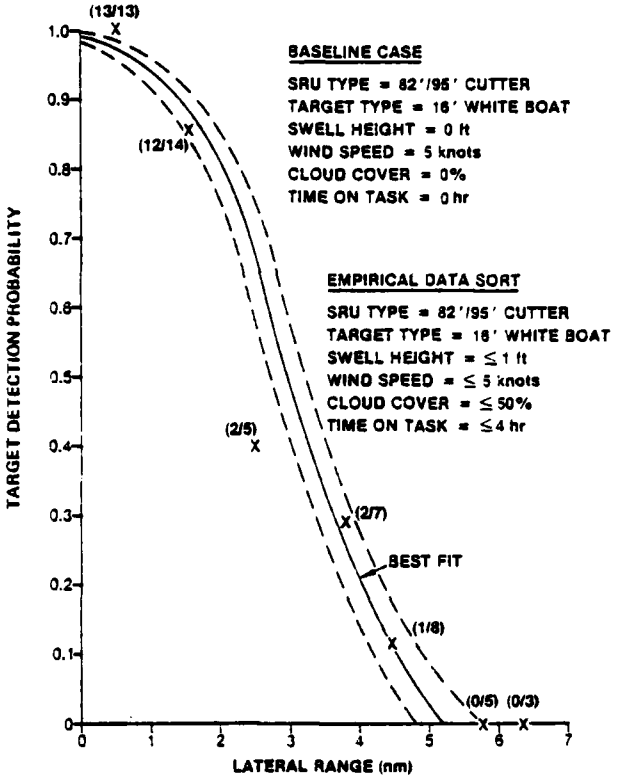


FIGURE 3-2. COMPUTED AND ACTUAL P(x) VERSUS LATERAL RANGE FOR BASELINE CASE -- CUTTERS SEARCHING FOR 16-FOOT BOATS

For this case, a P(x) of 0.94 is predicted for a lateral range of 1.0 nautical mile. Also shown on this figure are the experimental results sorted on lateral range for similar conditions as the baseline case (the ratios in parentheses indicate detections/opportunities). Table 3-1 shows the extent to which this P(x) would be changed by the indicated change in significant parameters (all other things remaining constant).

As Figure 3-3 shows, there was generally a linear relationship between wind speed and swell height over the range tested (0-25 knots), with

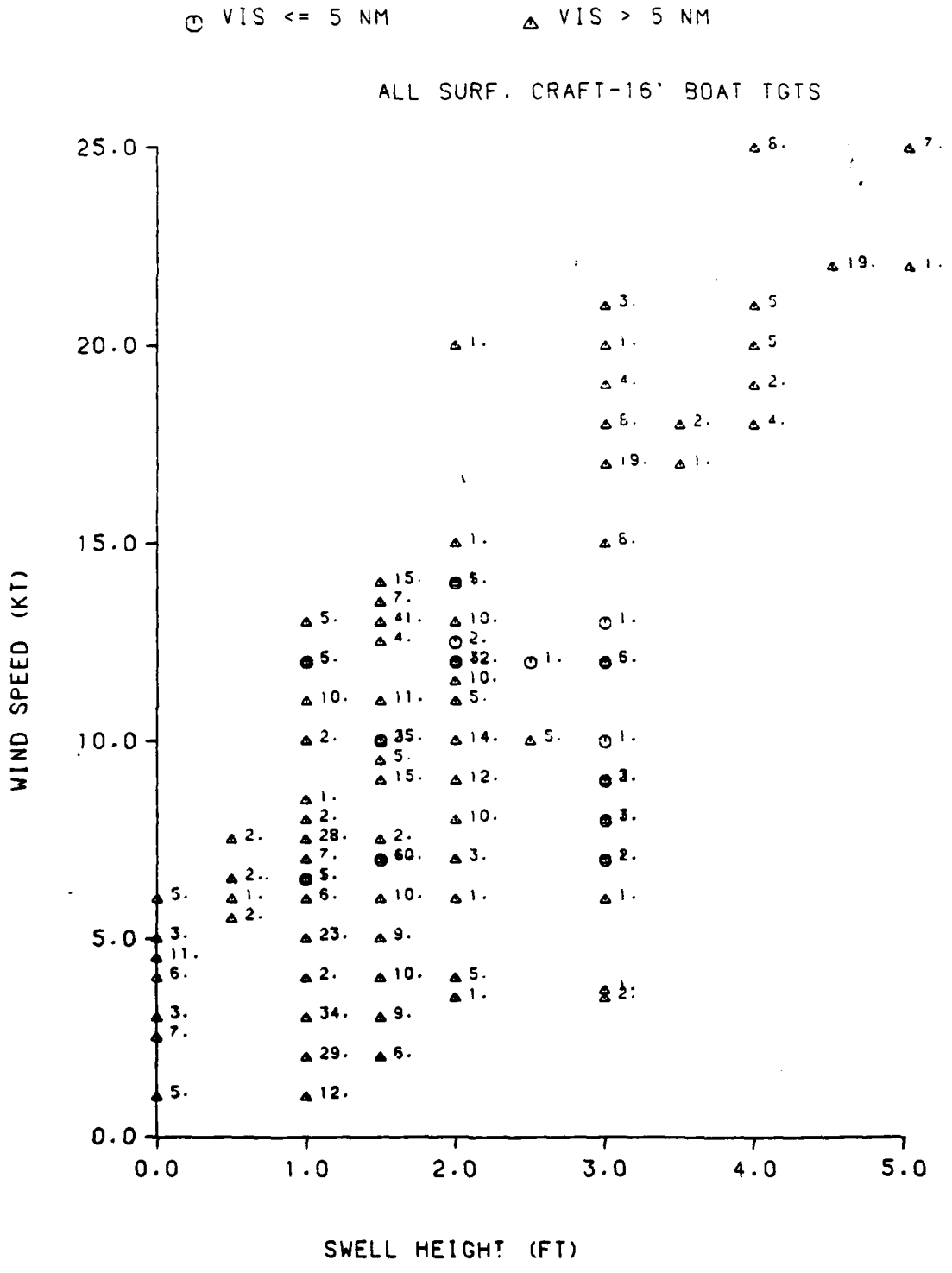


FIGURE 3-3. DISTRIBUTION OF WIND SPEED AND SWELL HEIGHT FOR SURFACE CRAFT (16-FOOT BOAT TARGETS)

each 1-foot increase in swell height being associated with a 5-knot increase in wind speed. Thus, the collective influence of changes in wind speed and swell height is shown in Table 3-1. These parameters together had the greatest influence on P(x), which seems reasonable since the target was a low freeboard 16-foot boat. When swell height is about 3 feet or greater, the target may be completely masked when in wave troughs. Further, as wind speed increases, white caps* appear; these can easily be mistaken for small boats, the false contact rate increases, and the lookout's scan pattern is disrupted.

TABLE 3-1. INFLUENCE ON P(x) OF CHANGES IN SIGNIFICANT PARAMETERS -- SURFACE CRAFT SEARCHING FOR 16-FOOT BOATS**

SIGNIFICANT PARAMETERS			PROBABILITY OF DETECTION	
PARAMETER(S)	BASELINE VALUES	MODIFIED VALUES	BASELINE CASE	MODIFIED CASE
Wind speed and swell height	5 knots and 0 feet	20 knots and 4 feet	0.94	0.41
Time on task	0 hours	6 hours	0.94	0.87
Cloud cover	0 percent	100 percent	0.94	0.91
SRU type	Cutter	Boat	0.94	0.90
Target color	White	Blue	0.94	0.91

**Predicted P(x) at a lateral range of 1 nm.

The next most influential parameter was found to be time on task. An increase in time on task from 0 to 6 hours was predicted to cause a reduction in P(x) from 0.94 to 0.87. There are several human factors (fatigue, motivation, stress) that potentially contribute to these results. Human

*White caps are considered a function of wind in this study; in the SAR Manual, a white cap correction factor is applied based on wind speed only.

factors effects on lookout performance are being investigated in parallel with the effort described here and will be the subject of a separate report.

SRU type (82/95-foot cutters or 41/44-foot boats) was the next most influential parameter, with cutters having consistently better detection performance than boats.

This is not surprising because of the physical and operational differences between the units, such as:

1. 82/95-foot cutters are larger, more stable search platforms, providing a higher height of eye, and are subject to less disruption by rough weather.

2. Cutters had more lookouts searching at any one time (four versus two for the boats) and, additionally, due to their larger crew size, lookouts could be rotated routinely which was not the case for 41/44-foot boats.

3. Because of a more stable platform, cutter lookouts could make better use of visual aids (binoculars).

As Table 3-1 shows, changes in cloud cover and target color had similar effects on the predicted probability of detection, with their influence being less than that of the previously-mentioned parameters. The only variables tested that were not found to significantly influence P(x) were visibility, search speed, and elevation of the sun.

It may seem surprising that visibility did not significantly influence P(x) until one studies the relationship between visibility and detection ranges. Figure 3-4 shows the distribution of visibility and cloud cover that was associated with the detection opportunities. Of the 642 opportunities represented in this data base, only 29 occurred with visibility less than or equal to 5 nautical miles. For visibilities greater than 5 nautical miles, the mean detection range of 16-foot boat targets was 1.0 nautical mile, and

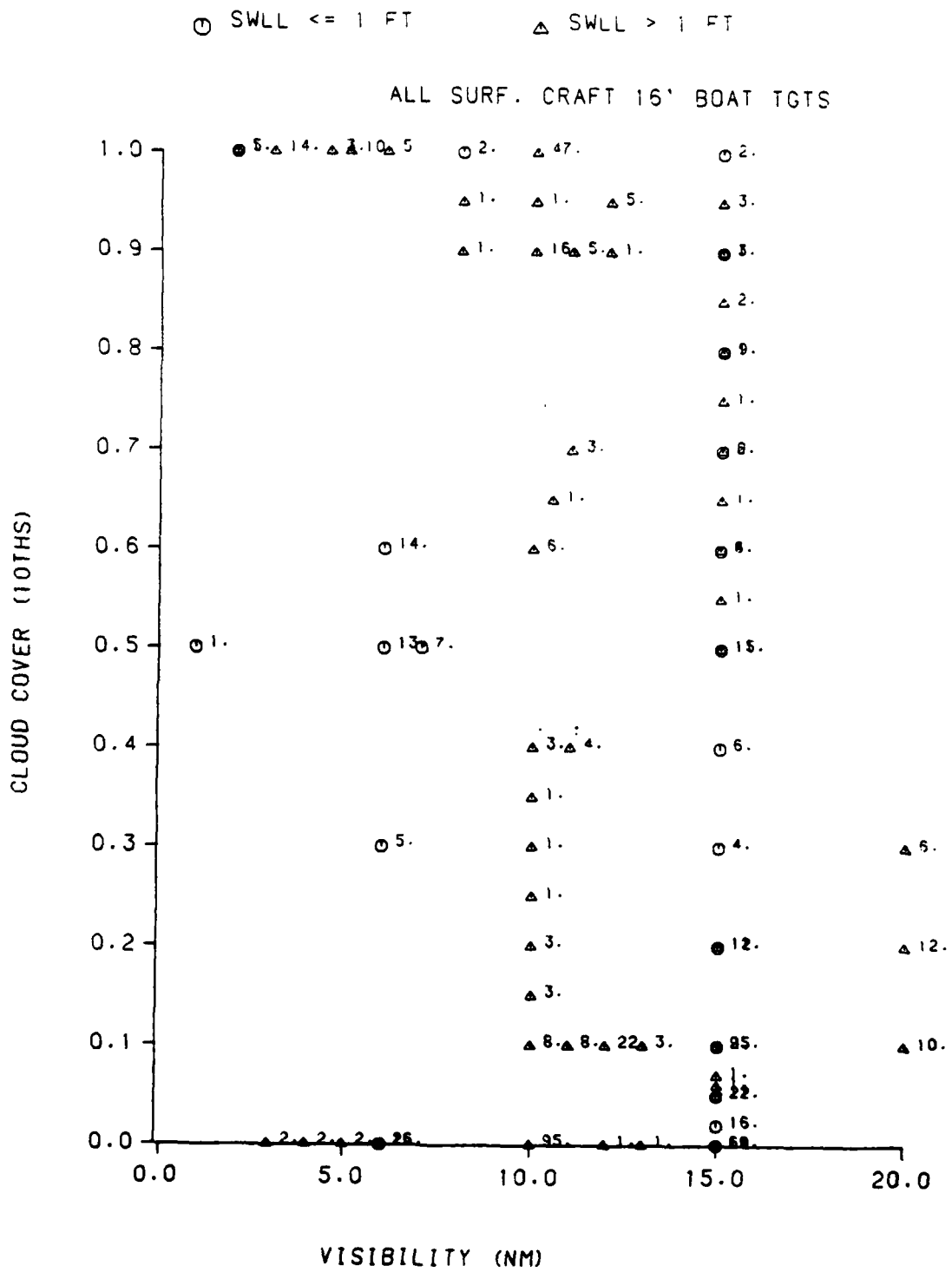


FIGURE 3-4. DISTRIBUTION OF VISIBILITY AND CLOUD COVER FOR SURFACE CRAFT (16-FOOT BOAT TARGETS)

the maximum detection range was 5.3 nautical miles; when visibility was less than or equal to 5 nautical miles, the mean detection range was 0.9 nautical mile, and the maximum detection range was 3.4 nautical miles. Since these detection ranges are similar for the two cases and are less than the minimum visibility meaningfully represented in the data base (5 nautical miles), it seems reasonable that visibility did not significantly influence P(x). On the other hand, it is clear that if lower visibility data (1-3 nautical miles) had been represented in the data base, then visibility would be a significant parameter as shown in Section 3.2.

The fact that search speed did not influence results seems reasonable since the relatively low range of speeds possible for these surface craft (less than 25 knots) should provide lookouts with ample opportunity to effectively search out the assigned area even at maximum speed. Also, as shown in Figure 3-5, the elevation of the sun during these experiments varied primarily between 20 degrees and 70 degrees. Over this range, the sun's glare effects do not vary appreciably and illumination of the targets is relatively constant; thus, it does not seem surprising that this parameter did not significantly influence probability of detection.

Search planners do not currently rely directly upon probability of detection versus lateral range curves for predicting search unit detection performance. Rather, as described in Chapter 1, sweep width, which is a single number representation of the lateral range curve, is used. Thus, Sections 3.1.1 through 3.1.3, which provide quantitative measures of surface SRUs abilities to detect 16-foot boats, will be presented in terms of sweep width.

3.1.1 41/44-Foot Boat Sweep Widths. Table 3-2 presents estimates of 41/44-foot boat sweep width and 90 percent confidence interval for environmental conditions represented in the 16-foot boat target data base.

3.1.2 82/95-Foot Cutter Sweep Widths. Table 3-3 presents estimates of cutter sweep width and 90 percent confidence interval for environmental conditions represented in the 16-foot boat target data base.

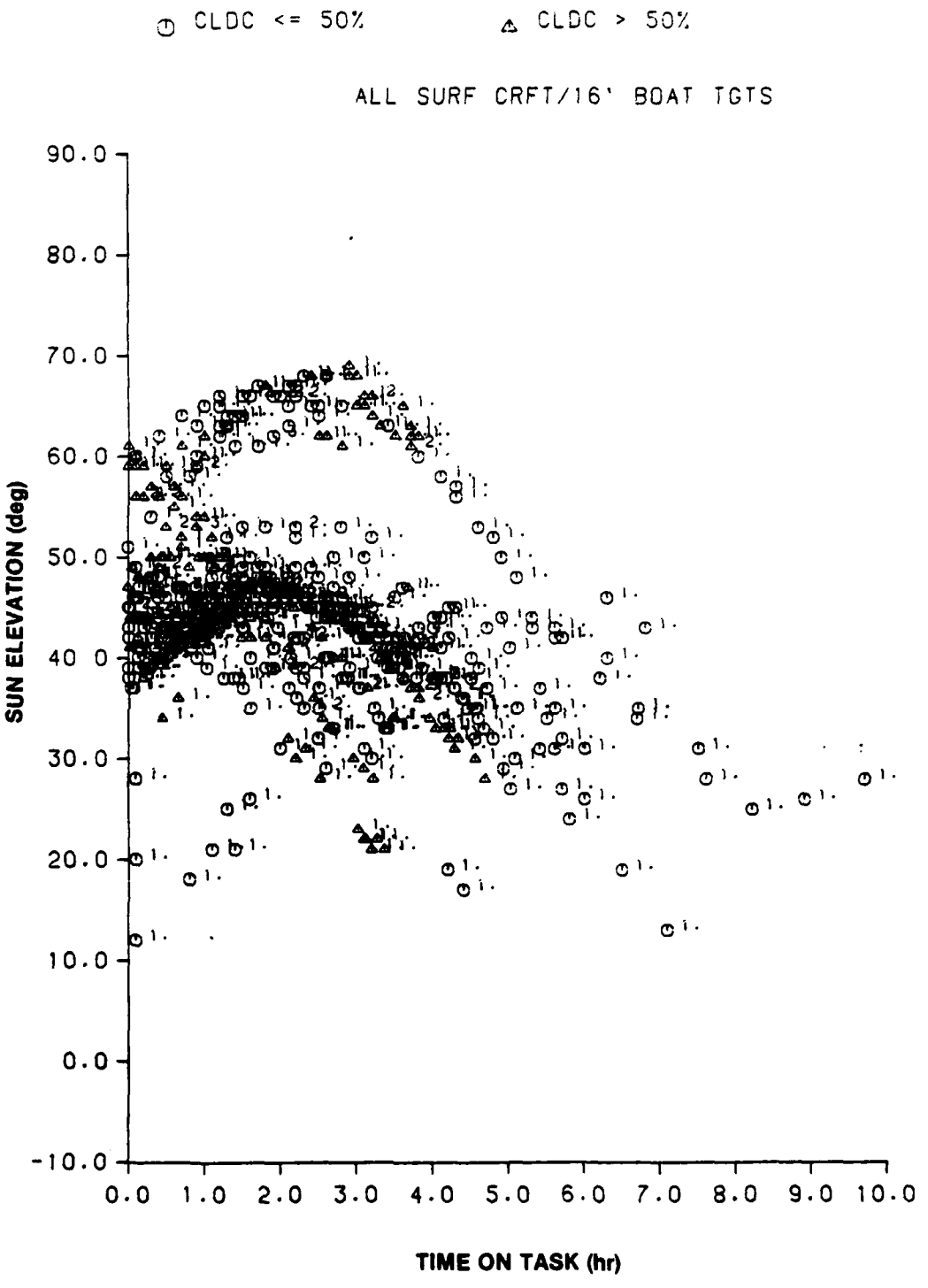


FIGURE 3-5. DISTRIBUTION OF SUN'S ELEVATION AND TIME ON TASK FOR SURFACE CRAFT (16-FOOT BOAT TARGET)

TABLE 3-2. SWEEP WIDTH TABLES FOR 41/44-FOOT BOATS SEARCHING FOR 16-FOOT BOATS*

SWEEP WIDTH (nm)**		ENVIRONMENTAL CONDITIONS		
BLUE BOAT	WHITE BOAT	WIND SPEED (knots)	CLOUD COVER (percent)	SWELL HEIGHT (feet)
3.7 ± 0.7	4.7 ± 0.7	5	0	0
1.8 ± 0.5	2.6 ± 0.4	10	0	2
1.4 ± 0.4	2.2 ± 0.4	10	50	2
1.1 ± 0.4	1.8 ± 0.4	10	100	2
0.5 ± 0.3	1.0 ± 0.3	15	100	3
0.2 ± 0.1	0.4 ± 0.2	20	100	4

TABLE 3-3. SWEEP WIDTH TABLES FOR CUTTERS SEARCHING FOR 16-FOOT BOATS*

SWEEP WIDTH (nm)**		ENVIRONMENTAL CONDITIONS		
BLUE BOAT	WHITE BOAT	WIND SPEED (knots)	CLOUD COVER (percent)	SWELL HEIGHT (feet)
4.9 ± 0.7	5.7 ± 0.6	5	0	0
2.8 ± 0.6	3.7 ± 0.5	10	0	2
2.4 ± 0.5	3.3 ± 0.5	10	50	2
2.0 ± 0.5	2.8 ± 0.5	10	100	2
1.1 ± 0.4	1.7 ± 0.4	15	100	3
0.5 ± 0.3	0.9 ± 0.3	20	100	4

*Sweep width values are calculated for a mean time on task of 2 hours.

**Value shown is best estimate of sweep width and 90% confidence interval (i.e., 95% confidence that the sweep width is no less than the lower bound).

3.1.3 Comparison of Cutter and Boat Sweep Widths. As noted in Section 3.1, cutters had consistently better detection performance for all environmental conditions experienced. This difference in performance is quantified in Figure 3-6 for two different sets of environmental conditions and times on task from 0 to 5 hours.

It is also of interest to compare the sweep width estimates developed in Edwards et al. (Reference 2) with the results presented in Figure 3-6 and Tables 3-2 and 3-3. The cutter sweep width estimates for white 16-foot boats presented in Table 3-3 are identical to those of Edwards et al. for similar conditions. In contrast the 41/44-foot boat sweep width estimates of Table 3-2 for white 16-foot boat targets are consistently lower than the Edwards et al. sweep width estimates for similar conditions (but within the 90 percent confidence interval).

3.2 Surface Craft Detection of Life Rafts

The experiments provided a total of 299 life raft detection opportunities for cutters and 158 detection opportunities for 41/44-foot boats. The variability in probability of detection was explained at a 0.01 level of significance by a combination of the following variables:

1. Lateral range
2. Time on task
3. Swell height
4. Wind speed
5. Visibility
6. Cloud cover
7. SRU type (41/44-foot boat or 82/95-foot cutter)
8. Target type and color (black raft, orange raft, or orange raft with canopy)

With the exception of visibility, these are the same parameters that influenced P(x) for the 16-foot boats. Environmental conditions for raft targets had more variability in visibility and less variability in wind speed

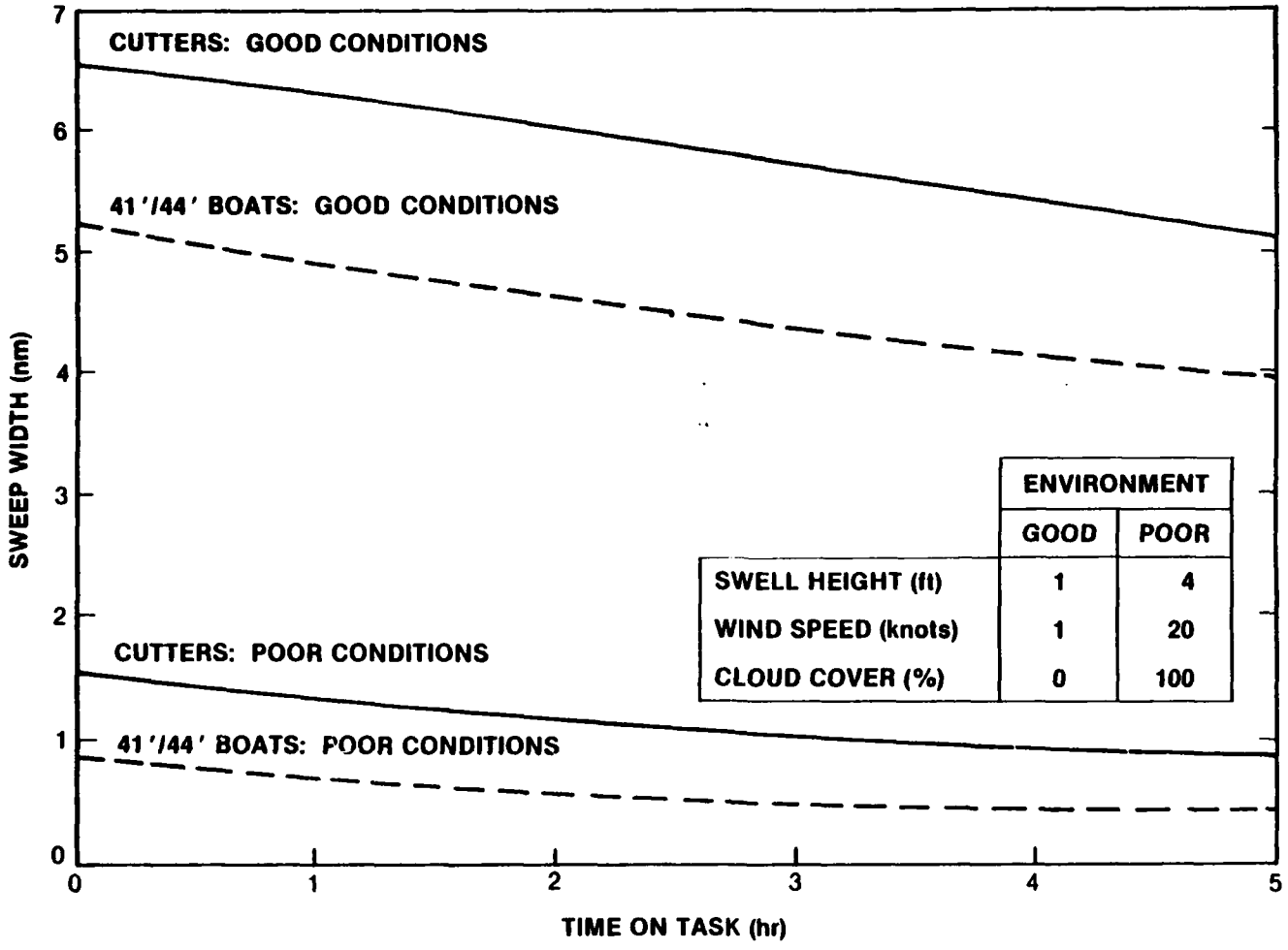


FIGURE 3-6. COMPARISON OF 41/44-FOOT BOAT AND CUTTER PERFORMANCE AS TIME ON TASK INCREASES (WHITE 16-FOOT BOAT TARGETS)

and swell height than conditions for 16-foot boat targets. This alone would possibly account for visibility being a significant parameter for rafts but not 16-foot boats. However, when the empirical data is analyzed, it also indicates that as visibility decreased below 10 nautical miles a reduction in raft detectability was evident, while a reduction in detectability was not evident for 16-foot boat targets (see Table 3-4). No reason for this difference is apparent due to distribution of data bases but may be caused by the difference in target types (height above water) and color.

One surprising result was that under similar conditions some life rafts (orange with canopy) were found to be somewhat more detectable than 16-foot boats (see Figure 3-7). This comparison could be made for only a limited set of relatively good environmental conditions (wind speeds $\leq$ 15 knots, swell height < 2 feet, visibility > 5 nautical miles). Since at farther detection ranges all colors appear a shade of grey (Reference 5), the orange canopy life raft may be more detectable than a white 16-foot boat due

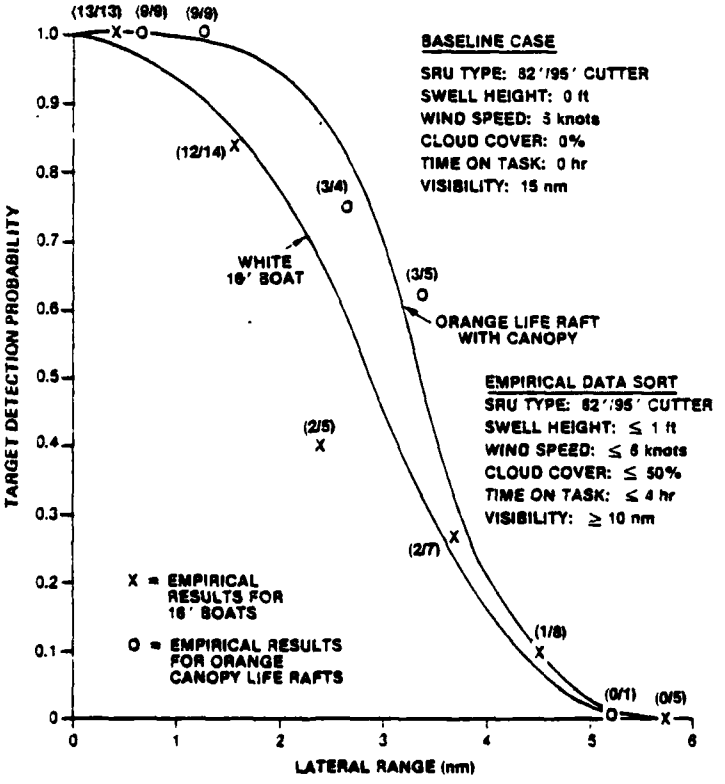


FIGURE 3-7. COMPARISON OF COMPUTED AND ACTUAL P(x) FOR LIFE RAFTS AND 16-FOOT BOATS (SURFACE VESSELS)

TABLE 3-4. DETECTION RATIOS VERSUS VISIBILITY FOR LIFE RAFTS AND 16-FOOT BOATS (SURFACE VESSEL SEARCHERS)

VISIBILITY (nm)	LATERAL RANGE (nm)									
	0-1		1-2		2-3		3-4		>4	
	RAFTS	BOATS	RAFTS	BOATS	RAFTS	BOATS	RAFTS	BOATS	RAFTS	BOATS
0-5	(5/7) 0.71	(5/5) 1.00	(1/16) 0.06	(1/6) 0.17	(0/2) 0.0	(1/3) 0.33	-	(0/3) 0.0	-	(0/2) 0.0
5-10	(33/34) 0.97	(51/75) 0.68	(8/22) 0.36	(22/61) 0.36	(0/3) 0.0	(9/34) 0.26	(0/2) 0.0	(2/23) 0.09	-	(1/9) 0.11
10-15	(98/113) 0.87	(43/53) 0.81	(58/92) 0.63	(29/46) 0.63	(25/78) 0.32	(12/28) 0.32	(8/37) 0.22	(4/28) 0.14	(0/18) 0.0	(3/36) 0.08
15-20	(7/9) 0.78	(8/13) 0.62	(3/6) 0.50	(3/7) 0.43	(1/2) 0.50	(1/4) 0.25	(1/5) 0.20	(0/2) 0.0	(0/4) 0.0	(0/2) 0.0

NOTE: The number in parentheses is the ratio of detections/opportunities; the number below is the ratio as a fraction.

to color only at close range and due to silhouette height above water (3.8 ft vs 1.7 ft, respectively) at far ranges. It is speculated that visibility changes would have greater effect on targets with larger detection ranges.

For the case shown in Figure 3-7, a P(x) of 0.95 is predicted at a lateral range of 2.0 nautical miles. Table 3-5 shows the extent to which this P(x) would be changed by the indicated change in significant parameters (all other things remaining constant).

TABLE 3-5. INFLUENCE ON P(x) OF CHANGES IN SIGNIFICANT PARAMETERS -- SURFACE CRAFT SEARCHING FOR LIFE RAFTS*

SIGNIFICANT PARAMETERS			PROBABILITY OF DETECTION	
PARAMETER(S)	BASELINE VALUES	MODIFIED VALUES	BASELINE CASE	MODIFIED CASE
Wind speed and swell height	5 knots and 0 feet	10 knots and 2 feet	0.95	0.60
Time on task	0 hours	5 hours	0.95	0.83
Visibility	15 nm	5 nm	0.95	0.66
Cloud cover	0 percent	100 percent	0.95	0.89
SRU type	Cutter	Boat	0.95	0.79
Target type	Orange raft with canopy	Orange raft	0.95	0.91
Target color**	Orange raft	Black raft	0.91	0.87

*P(x) calculated at a lateral range of 2.0 nm.
**P(x) for an orange life raft without canopy is a departure from the baseline case but is comparable in size and shape to the black life raft without canopy.

Wind speed and swell height had little variability (see Figure 3-8); however, their collective influence was still greater than that of any other parameter. Visibility was the next most important parameter, with the

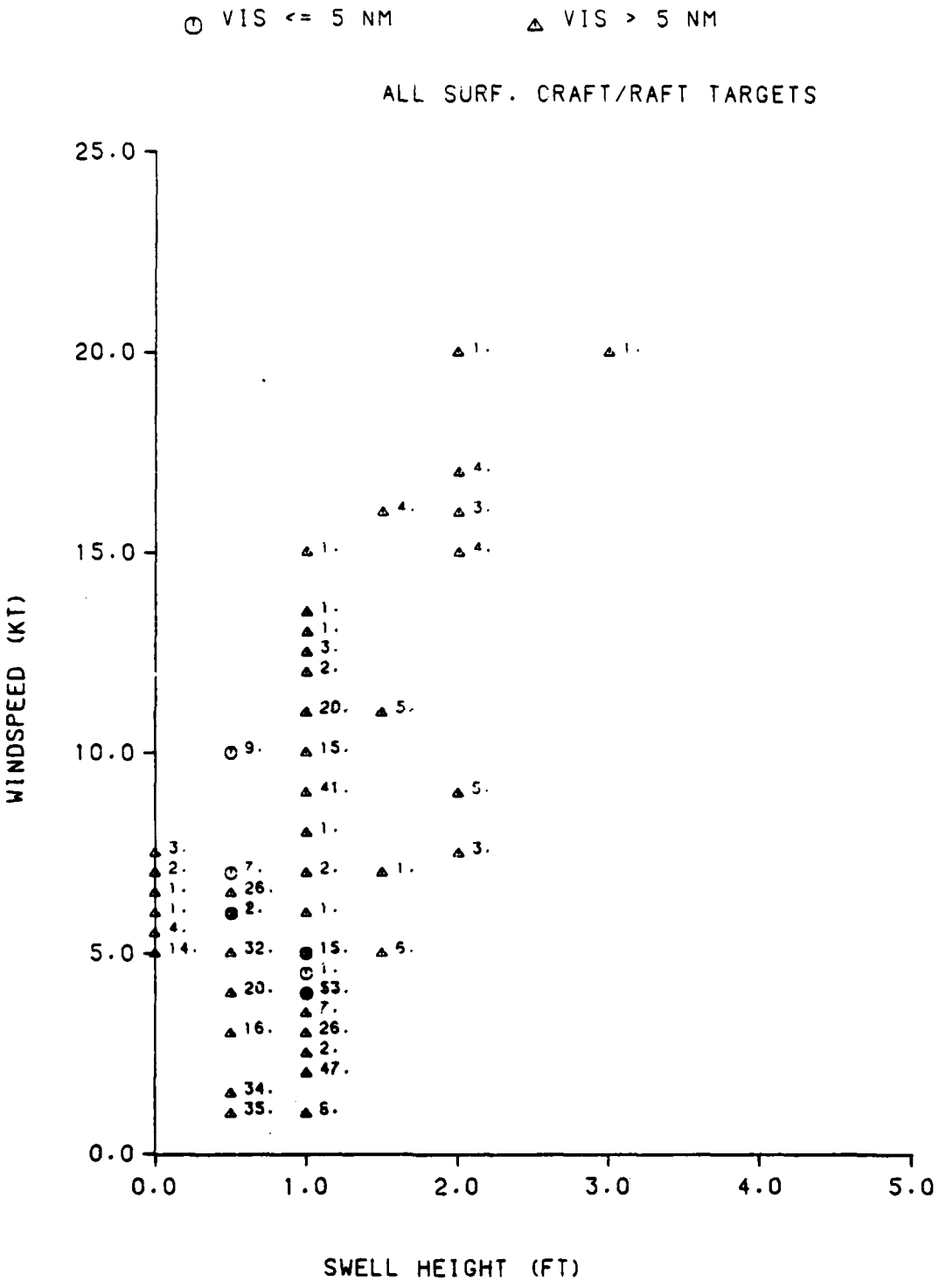


FIGURE 3-8. DISTRIBUTION OF WIND SPEED AND SWELL HEIGHT FOR SURFACE CRAFT (LIFE RAFT TARGETS)

influence of the other significant parameters being substantially less than wind speed, swell height, and visibility. As was the case for the 16-foot boat targets, search speed and elevation of the sun were not significant parameters.

3.2.1 41/44-Foot Boat Sweep Widths. Table 3-6 presents estimates of 41/44-foot boat sweep widths and 90 percent confidence interval for environmental conditions represented in the life raft target data base.

TABLE 3-6. SWEEP WIDTH TABLES FOR 41/44-FOOT BOATS SEARCHING FOR LIFE RAFTS*

SWEEP WIDTH** (nm)			ENVIRONMENTAL CONDITIONS			
ORANGE CANOPY RAFT	ORANGE RAFT	BLACK RAFT	WIND SPEED (knots)	SWELL HEIGHT (feet)	VISIBILITY (nm)	CLOUD COVER (percent)
4.6 ± .7	4.1 ± .7	3.6 ± .7	5	0	15	0
3.0 ± .6	2.5 ± .5	2.1 ± .5	10	1	15	0
2.6 ± .5	2.2 ± .5	1.7 ± .5	10	1	15	50
2.2 ± .6	1.8 ± .6	1.4 ± .6	10	1	15	100
1.7 ± .7	1.3 ± .6	1.0 ± .6	10	2	15	100
0.7 ± .4	0.5 ± .3	0.3 ± .2	10	2	5	100

*For a time on task of 2.0 hours.
**Sweep width shown is best estimate and 90 percent two-sided confidence interval (i.e., 95 percent confidence that sweep width is greater than lower bound).

3.2.2 82/95-Foot Cutter Sweep Widths. Table 3-7 presents estimates of 82/95-foot cutter sweep width and 90 percent confidence interval for environmental conditions represented in the life raft target data base.

TABLE 3-7. SWEEP WIDTH TABLES FOR 82/95-FOOT CUTTERS SEARCHING FOR LIFE RAFTS*

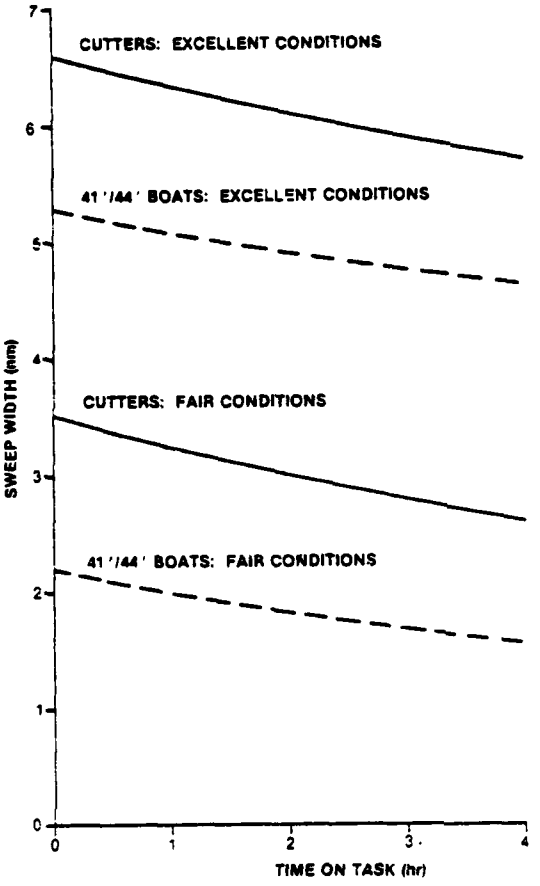
SWEEP WIDTH** (nm)			ENVIRONMENTAL CONDITIONS			
ORANGE CANOPY RAFT	ORANGE RAFT	BLACK RAFT	WIND SPEED (knots)	SWELL HEIGHT (feet)	VISIBILITY (nm)	CLOUD COVER (percent)
6.1 ± .6	5.7 ± .6	5.2 ± .7	5	0	15	0
4.5 ± .6	4.0 ± .5	3.5 ± .6	10	1	15	0
4.1 ± .5	3.6 ± .5	3.1 ± .5	10	1	15	50
3.7 ± .6	3.2 ± .6	2.7 ± .7	10	1	15	100
3.1 ± .9	2.6 ± .8	2.2 ± .8	10	2	15	100
1.7 ± .6	1.3 ± .5	1.0 ± .5	10	1	5	100

*For a time on task of 2.0 hours.
**Sweep width shown is best estimate and 90 percent two-sided confidence interval (i.e., 95 percent confidence that sweep width is greater than lower bound).

3.2.3 Comparison of Cutter and Boat Sweep Widths. As noted in Section 3.2, cutters had consistently better detection performance for all environmental conditions experienced. This difference in performance is quantified in Figure 3-9 for two different environmental conditions and times on task from 0 to 4 hours because these are the longest times on task meaningfully represented by both surface craft types in the data base.

3.3 Aircraft Detection of 16-Foot Boats

The experiments provided a total of 371 16-foot boat detection opportunities for helicopters and 405 detection opportunities for fixed wing aircraft. The variability in probability of detection was explained at a 0.01 level of significance by a combination of the following variables:



	ENVIRONMENT	
	EXCELLENT	FAIR
VISIBILITY (nm)	15	15
WIND SPEED (knots)	5	15
CLOUD COVER (%)	0	100
SWELL HEIGHT (ft)	0	2

FIGURE 3-9. COMPARISON OF CUTTER AND BOAT SWEEP WIDTHS (ORANGE CANOPY LIFE RAFT TARGETS)

1. Lateral range
2. Wind speed
3. Visibility
4. Cloud cover
5. Target color
6. SRU type
7. Search speed (fixed wing aircraft only)
8. Time on task (helicopters only)

Figure 3-10 shows a predicted P(x) versus lateral range curve and empirical data for the following baseline case:

SRU type: Helicopter
Target type: 16-foot white boat
Wind speed: 5 knots
Visibility: 15 nm
Cloud cover: 0 percent

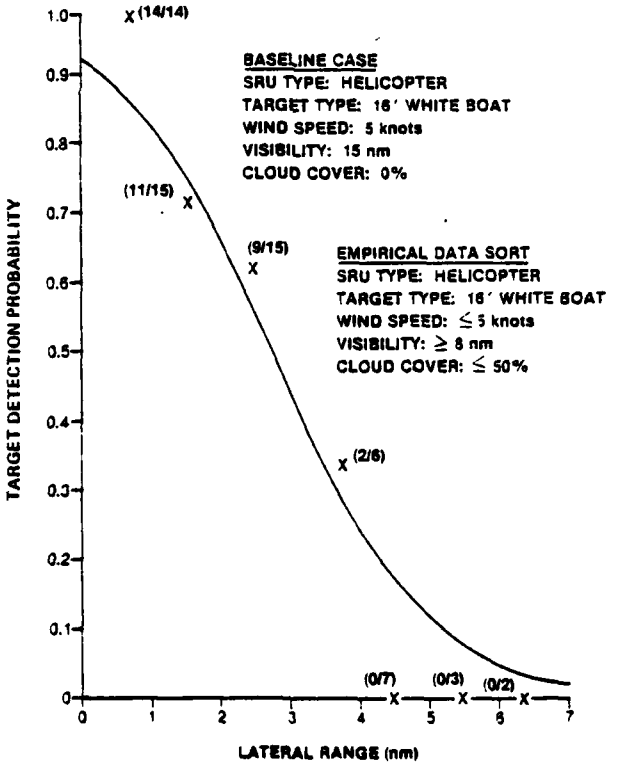


FIGURE 3-10. COMPUTED AND ACTUAL P(x) VERSUS LATERAL RANGE FOR BASELINE CASE (HELICOPTERS SEARCHING FOR 16-FOOT WHITE BOATS)

For this case, a P(x) of 0.83 is predicted for a lateral range of 1.0 nautical mile. Table 3-8 shows the extent to which this P(x) would be changed by the indicated change in significant parameters (all other things remaining constant).

Changes in wind speed had the most influence on P(x) with changes in visibility and cloud cover having similar effects (over the range of conditions experienced) while changes in target type or SRU type had lesser effects. These results are, in general, consistent with surface craft results previously presented.

TABLE 3-8. INFLUENCE ON P(x) OF CHANGES IN SIGNIFICANT PARAMETERS --AIRCRAFT SEARCHING FOR 16-FOOT BOATS

SIGNIFICANT PARAMETERS**			PROBABILITY OF DETECTION*	
PARAMETER(S)	BASELINE VALUES	MODIFIED VALUES	BASELINE CASE	MODIFIED CASE
Wind speed (knots)	5	15	0.83	0.57
Visibility (nm)	15	5	0.83	0.69
Cloud cover (percent)	0	100	0.83	0.71
Target color	White	Blue	0.83	0.78
SRU type	Helicopter	Fixed wing aircraft	0.83	0.78

*Predicted P(x) at a lateral range of 1 nm.
**Search speed was found to be a significant parameter for fixed wing aircraft only and time on task a significant parameter for helicopters only. The influence of these parameters on detection performance is therefore discussed separately.

Search speed influenced the performance of fixed wing aircraft but not helicopters, while time on task was a significant parameter for helicopters but not for fixed wing aircraft; based upon physical differences in the platforms, these results seem reasonable. It is postulated that in the range of helicopter speeds (from 60 to 120 knots) sufficient time is available to conduct a relatively thorough search of the assigned area, while for speeds above 120 knots, the thoroughness of the search is significantly reduced. Figure 3-11 shows the predicted reduction in fixed wing aircraft sweep width as search speed is increased. It is of interest that the reduction in fixed wing aircraft performance at higher speeds primarily manifested itself at longer lateral ranges, with no apparent difference noted for lateral ranges less than one nautical mile (see Table 3-9). It is postulated that the relatively severe helicopter environment (high noise level and vibrations) contributes to the rapid reduction in sweep width with time on task. The mean time on task for helicopters was 1.1 hours, with almost all data for a time on task less than 3.0 hours. While the mean time on task for fixed wing aircraft was almost the same as helicopters (1.0 hour), it is postulated that the less severe environment and ability to rotate scanners resulted in time on task not being a significant parameter for fixed wing aircraft. Figure 3-12 shows the reduction in helicopter sweep width with time on task.

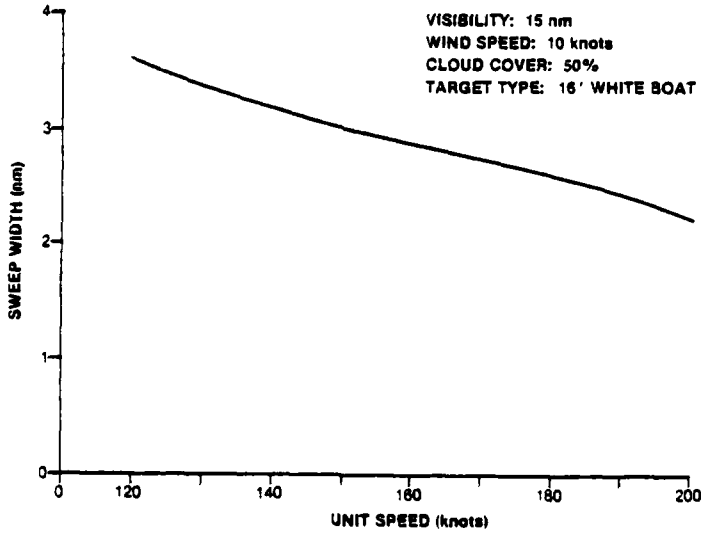


FIGURE 3-11. INFLUENCE OF SEARCH SPEED ON FIXED WING AIRCRAFT SWEEP WIDTH (16-FOOT BOAT TARGET)

TABLE 3-9. EMPIRICAL RESULTS SORTED ON SEARCH SPEED FOR FIXED WING AIRCRAFT (16-FOOT BOAT TARGETS)

SEARCH SPEED (knots)	LATERAL RANGE (nm)				
	0-1	1-2	2-3	3-4	>4
<130	(12/18) 0.67	(11/19) 0.58	(3/12) 0.25	(2/13) 0.15	(0/4) 0.0
130-160	(43/66) 0.65	(21/53) 0.40	(10/49) 0.20	(4/28) 0.14	(1/12) 0.08
>160	(33/50) 0.66	(14/35) 0.40	(3/35) 0.09	(0/9) 0.0	(0.2) 0.0

NOTE: The number in parentheses is the ratio of detections/opportunities; the number below is the ratio as a fraction.

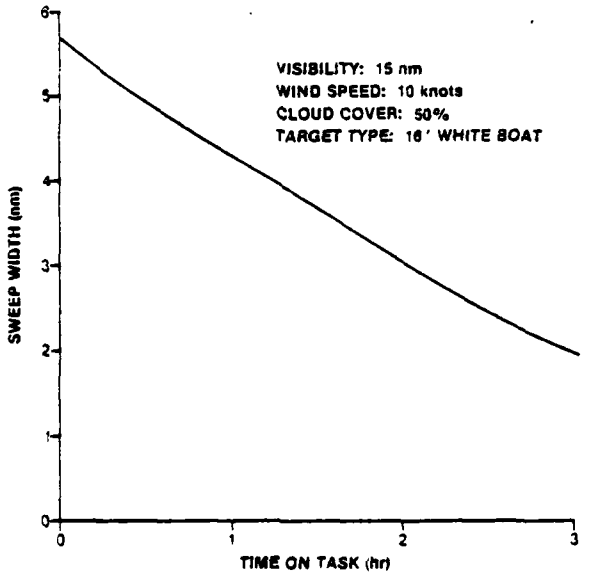


FIGURE 3-12. INFLUENCE OF TIME ON TASK ON HELICOPTER SWEEP WIDTH (16-FOOT BOAT TARGET)

The only parameters not found to have a significant influence on P(x) were elevation of the sun, swell height, and altitude. Elevation of the sun generally varied between 20 and 70 degrees and, as demonstrated for surface craft, detectability is not expected to vary significantly over this range. There was also little variability in swell height (0 to 2 feet), and wind speed was highly correlated with swell height so that wind speed alone was apparently sufficient in explaining variability in P(x). The altitude of the aircraft was held constant for this portion of the experiments (helicopters at 500 feet and fixed wing aircraft at 1000 feet) in order to better evaluate search speed effects; therefore, no effects of altitude on P(x) could be studied for this data base. Altitude may attribute to the differences in SRU type performance or may be insignificant below 1000 feet as indicated in the life raft detection data base (see Section 3.4)

3.3.1 Helicopter Sweep Width Estimates. Table 3-10 presents estimates of helicopter sweep widths and 90 percent confidence intervals for environmental conditions represented in the 16-foot boat data base.

TABLE 3-10. SWEEP WIDTH TABLES FOR HELICOPTERS SEARCHING FOR 16-FOOT BOATS*

SWEEP WIDTH (nm)**		ENVIRONMENTAL CONDITIONS		
BLUE BOAT	WHITE BOAT	WIND SPEED (knots)	VISIBILITY (nm)	CLOUD COVER (percent)
5.0 ± .7	5.6 ± .5	5	15	0
3.8 ± .7	4.4 ± .6	10	15	0
2.6 ± .6	3.2 ± .5	10	15	100
2.4 ± .5	2.9 ± .6	5	5	100
1.8 ± .5	2.2 ± .4	15	15	100

*For a time on task of 1.0 hour.
**Value shown is best estimate of sweep width and 90 percent confidence interval (i.e., 95 percent confidence that the sweep width is no less than the lower bound).

3.3.2 Fixed Wing Aircraft Sweep Width Estimates. Table 3-11 presents estimates of fixed wing aircraft sweep widths and 90 percent confidence intervals for environmental conditions represented in the 16-foot boat data base.

TABLE 3-11. SWEEP WIDTH TABLES FOR FIXED WING AIRCRAFT SEARCHING FOR 16-FOOT BOATS*

SWEEP WIDTH (nm)**		ENVIRONMENTAL CONDITIONS		
BLUE BOAT	WHITE BOAT	WIND SPEED (knots)	VISIBILITY (nm)	CLOUD COVER (percent)
3.7 ± .4	4.2 ± .7	5	15	0
2.8 ± .6	3.2 ± .5	10	15	0
2.0 ± .6	2.3 ± .4	10	15	100
1.8 ± .5	2.1 ± .4	5	5	100
1.3 ± .4	1.6 ± .4	15	15	100

*For a search speed of 150 knots.
**Value shown is best estimate of sweep width and 90 percent confidence interval (i.e., 95 percent confidence that the sweep width is no less than the lower bound).

3.4 Aircraft Detection of Life Rafts

The experiments provided a total of 164 life raft detection opportunities for helicopters and 195 detection opportunities for fixed wing aircraft. Variability in probability of detection was explained at a 0.01 level of significance by a combination of the following variables:

1. Lateral range
2. Wind speed
3. Swell height
4. Visibility

5. Target type and color (orange raft with canopy, orange raft, or black raft)
6. Elevation of the sun

Lateral range was the single most important variable in explaining variability in target detection probability with about three-quarters of the rafts at lateral ranges less than 1 nautical mile detected and only one raft in 20 detected at lateral ranges greater than 3 nautical miles.

Figure 3-13 shows a predicted P(x) versus lateral range curve for the following baseline case:

Target type:	Orange raft with canopy
Swell height:	1 foot
Wind speed:	5 knots
Visibility:	15 nm
Elevation of sun:	40 deg

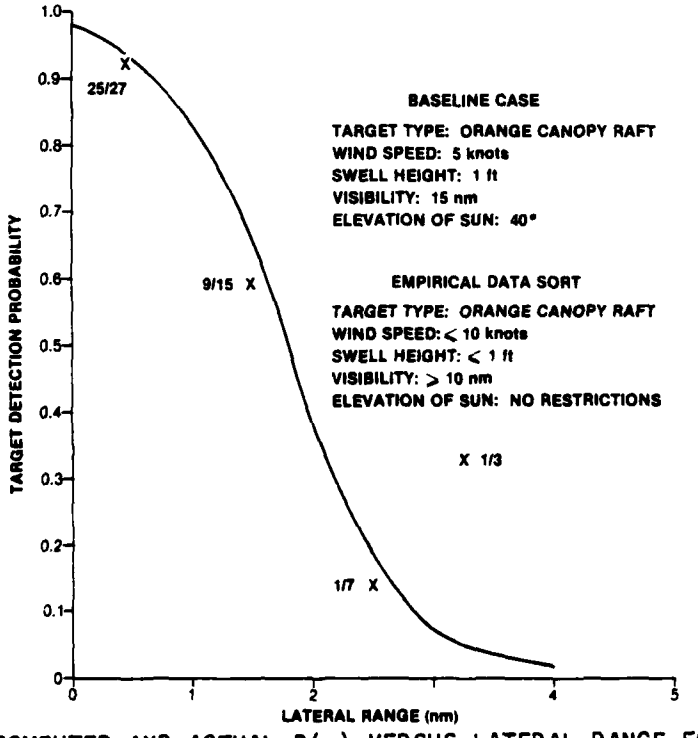


FIGURE 3-13. COMPUTED AND ACTUAL P(x) VERSUS LATERAL RANGE FOR BASELINE CASE (AIRCRAFT SEARCHING FOR RAFTS)

For this case a P(x) of 0.90 is predicted at a lateral range of 1.0 nautical mile. Table 3-12 shows the extent to which this P(x) would be changed by the indicated change in significant parameters (all other things remaining constant).

This data base included the most extreme wind speed and swell height conditions (30-knot winds and 3-foot swells) experienced due to the inclusion of open ocean HC-130 data collected during the January-February 1979 leeway drift experiment; thus the inclusion of wind speed and swell height as significant variables was expected.

The relative amount of low visibility data ($\leq$ 5 nautical miles) was about the same as other data bases (about 5 percent).

TABLE 3-12. INFLUENCE ON P(x) OF CHANGES IN SIGNIFICANT PARAMETERS -- AIRCRAFT SEARCHING FOR LIFE RAFTS*

SIGNIFICANT PARAMETERS			PROBABILITY OF DETECTION	
PARAMETER(S)	BASELINE VALUES	MODIFIED VALUES	BASELINE CASE	MODIFIED CASE
Wind speed and swell height	5 knots and 1 foot	20 knots and 4 feet	0.85	0.26
Visibility	15 nm	5 nm	0.85	0.70
Elevation of sun	40 degrees	0 degrees	0.85	0.72
Target type	Orange raft with canopy	Orange raft	0.85	0.77
Target color**	Orange raft	Black raft	0.77	0.66

*P(x) calculated at a lateral range of 1.0 nm.
**P(x) for an orange life raft without canopy is a departure from the baseline case but is comparable in size and shape to the black life raft without canopy.

The coefficient associated with target type was almost identical to the target type coefficient for surface craft searching for rafts, tending to reinforce the validity of the model.

Cloud cover, search speed, time on task, altitude, and search unit type were not found to be significant parameters. Cloud cover, while identified as a significant parameter in large data base models, had a relatively small effect on P(x) in these cases, so that it is not particularly surprising that cloud cover was not identified as significant; if additional data were collected, it is anticipated that a reduction in P(x) with increasing cloud cover would be identified. For these searches, the aircraft were kept at a constant speed and altitude was varied between 500 feet and 1000 feet for alternate searches in order to better evaluate the effect of altitude on P(x). Therefore, search speed was not evaluated as an explanatory variable but is anticipated to be insignificant for helicopters as indicated from the 16-foot boat data base (see section 3.3). Since no perceptible difference in detection performance was evident between 500 and 1000 feet altitudes, a strong effect of altitude on P(x) is not forecast. Collection of additional data would aid in identification of altitude effects (if any) on P(x) over the range of interest. It is suspected that higher altitudes would decrease the detection performance of both aircraft types.

It is of interest that time on task was not identified as a significant parameter for helicopters searching for rafts, while it had a fairly strong influence on P(x) for helicopters searching for 16-foot boats (see Section 3.3). Table 3-13 compares empirical results for the two categories, which tend to confirm that time on task shows no apparent effect on P(x) for raft targets while time on task shows an effect on P(x) for boat targets. No explanation seems apparent for these differences although the smaller raft data base is subject to more statistical fluctuation so that the time on task influence on P(x) may be masked for rafts.

No difference in detection performance was identified for these raft targets between helicopters and fixed wing aircraft while for boat targets, helicopters demonstrated better performance than fixed wing aircraft.

No reason for this inconsistency is apparent, although both aircraft types operated at various altitudes whereas helicopters and fixed wing aircraft were assigned certain altitudes when searching for boat targets. Once again, additional data would aid in identification of detection performance differences.

TABLE 3-13. INFLUENCE OF TIME ON TASK ON HELICOPTER DETECTION PERFORMANCE (EMPIRICAL RESULTS)

HELICOPTERS SEARCHING FOR RAFTS

TIME ON TASK (hours)	LATERAL RANGE (nm)				
	0-1	1-2	2-3	3-4	>4
0-1	(26/33) 0.79	(6/12) 0.50	(0/9) 0.0	(0/4) 0.0	-
1-2	(23/28) 0.82	(6/21) 0.29	(2/14) 0.14	(0/7) 0.0	-
2-3	(11/13) 0.85	(2/9) 0.22	(2/8) 0.25	(0.5) 0.0	-

HELICOPTERS SEARCHING FOR 16-FOOT BOATS

TIME ON TASK (hours)	LATERAL RANGE (nm)				
	0-1	1-2	2-3	3-4	>4
0-1	(33/41) 0.75	(22/40) 0.55	(22/39) 0.56	(1/4) 0.25	(3/29) 0.10
1-2	(28/43) 0.65	(20/43) 0.47	(5/26) 0.19	(3/17) 0.18	(0/20) 0.0
2-3	(8/9) 0.77	(5/15) 0.33	(1/10) 0.10	(0/23) 0.0	(1/11) 0.9

NOTE: The number in parentheses is the ratio of detection/opportunities; the number below is the ratio as a fraction.

3.4.1 Aircraft Sweep Widths. Table 3-14 presents estimates of aircraft sweep widths and 90 percent confidence interval for environmental conditions represented in the life raft data base.

TABLE 3-14. SWEEP WIDTH TABLES FOR AIRCRAFT SEARCHING FOR LIFE RAFTS

SWEEP WIDTH* (nm)			ENVIRONMENTAL CONDITIONS			
ORANGE RANGE WITH CANOPY	ORANGE RAFT	BLACK RAFT	VISIBILITY (nm)	WIND SPEED (knots)	SWELL HEIGHT (feet)	ELEVATION OF SUN (degrees)
3.7 ± .6	3.2 ± .5	2.7 ± .6	15	5	1	40
2.8 ± .5	2.4 ± .5	1.9 ± .5	15	10	2	40
2.2 ± .7	1.7 ± .7	1.4 ± .7	15	10	2	0
2.1 ± .5	1.7 ± .5	1.3 ± .5	5	10	2	40
2.0 ± .5	1.6 ± .4	1.2 ± .5	15	15	3	40
1.3 ± .6	1.0 ± .5	0.7 ± .5	15	20	4	40
0.2 ± .5	0.1 ± .3	0.1 ± .2	15	30	3	40

*Sweep width shown is the best estimate and 90 percent two-sided confidence interval (i.e., 95 percent confidence that sweep width is greater than lower bound).

3.5 Comparison of Surface Craft and Aircraft Detection Performance

3.5.1 16-Foot Boat Targets. Table 3-15 provides surface craft and aircraft sweep width estimates for representative environmental conditions.

3.5.2 Life Raft Targets. Table 3-16 provides surface craft and aircraft sweep width estimates for representative environmental conditions.

TABLE 3-15. COMPARISON OF AIRCRAFT AND SURFACE CRAFT SWEEP WIDTHS (WHITE 16-FOOT BOAT TARGETS)

SRU TYPE	SWEEP WIDTH (nm)	ENVIRONMENTAL CONDITIONS			
		VISIBILITY (nm)	WIND SPEED (knots)	CLOUD COVER (%)	SWELL HEIGHT (feet)
		EXCELLENT CONDITIONS			
82'/95' cutters	6.0	15	5	0	0
Helicopters	5.6				
41'/44' boats	4.7				
Fixed wing aircraft	4.2				
		GOOD CONDITIONS			
82'/95' cutters	3.8	10	10	0	2
Helicopters	3.6				
Fixed wing aircraft	2.7				
41'/44' boats	2.6				
		FAIR CONDITIONS			
82'/95' cutters	2.7	8	12	100	2
Helicopters	1.9				
41'/44' boats	1.7				
Fixed wing aircraft	1.4				
		POOR CONDITIONS			
82'/95' cutters	0.9	-	20	100	4
41'/44' boats	0.4				
Helicopters	-				
Fixed wing aircraft	-				

Note: 1. Surface craft mean time on task 2 hours. Helicopter mean time on task 1 hour. Fixed wing aircraft mean search speed 150 knots.
2. Significant surface craft variables: wind speed, cloud cover, swell height, time on task, SRU type, and target color.
3. Significant aircraft variables: visibility, wind speed, cloud cover, SRU type, and target color.

TABLE 3-16. COMPARISON OF AIRCRAFT AND SURFACE CRAFT SWEEP WIDTH (ORANGE CANOPIED LIFE RAFT TARGETS)

SRU TYPE	SWEEP WIDTH (nm)	ENVIRONMENTAL CONDITIONS				
		VISIBILITY (nm)	WIND SPEED (knots)	SWELL HEIGHT (feet)	CLOUD COVER (%)	SUN ELEVATION (degrees)
		EXCELLENT CONDITIONS				
82'/95' cutters 41'/44 boats Aircraft	5.4 4.0 3.6	15	5	1	0	40
		GOOD CONDITIONS				
82'/95' cutters Aircraft 41'/44' boats	3.5 2.8 2.0	15	10	2	50	40
		FAIR CONDITIONS				
82'/95' cutters Aircraft 41'/44' boats	2.7 2.4 1.4	5	10	1	100	40
		POOR CONDITIONS				
82'/95' cutters 41'/44' boats Aircraft	- - .2	15	30	3	*	40

*Not a significant parameter for aircraft.

Note: 1. Surface craft mean time on task 2 hours. Time on task is not a significant parameter for aircraft.
2. Significant surface craft variables: wind speed, swell height, visibility, time on task, cloud cover, SRU type, target type and target color.
3. Significant aircraft variables: wind speed, swell height, visibility, target color, target type and elevation of the sun.

3.6 Comparison of Experiment Results with SAR Manual Sweep Width Tables

This section provides a comparison of experiment sweep width estimates for 16-foot boat and life raft targets with the guidance currently available for SAR planning (the visual search sweep width tables of the SAR Manual).* The experiment results for 16-foot boats were compared to the SAR Manual sweep width tables for two SAR Manual target types (boats smaller than 30 feet and life rafts), while life raft results were compared to SAR Manual sweep width tables for life raft targets.

3.6.1 Comparison of Surface Craft Results for 16-Foot Boat Targets with SAR Manual Sweep Width Tables. Figure 3-14 provides a comparison for experiment environmental conditions of both cutter and SAR boat sweep width estimates for 16-foot boats with SAR Manual sweep width table values for boats under 30 feet in length and life rafts. This comparison was made by first selecting environmental conditions from Tables 3-1 and 3-2 that were represented in the sweep width tables.* Experimental sweep width values were then plotted against values from the SAR Manual sweep width tables for the same environmental conditions. (A visibility of 15 nautical miles was selected as representative of experiment conditions for surface craft.) As Figure 3-14 demonstrates, the influence of wind speed from 0 to 10 knots on sweep width was inconsistent with the SAR Manual. The present sweep width tables indicated that sweep width decreases as wind speed decreases from 10 to 0 knots, while the results of this experiment indicated the opposite effect. For low wind speeds, the experiment results for surface craft were nearly the same as the SAR Manual sweep width values for boats less than 30 feet. When wind speed reached 20 knots, experiment results were nearly the same as the SAR Manual sweep width values for life rafts. The implication of these experimental results is that degradation in environmental conditions had a greater influence on sweep widths for 16-foot boat targets than predicted by the present model.

*Sweep width tables are included as Appendix B.

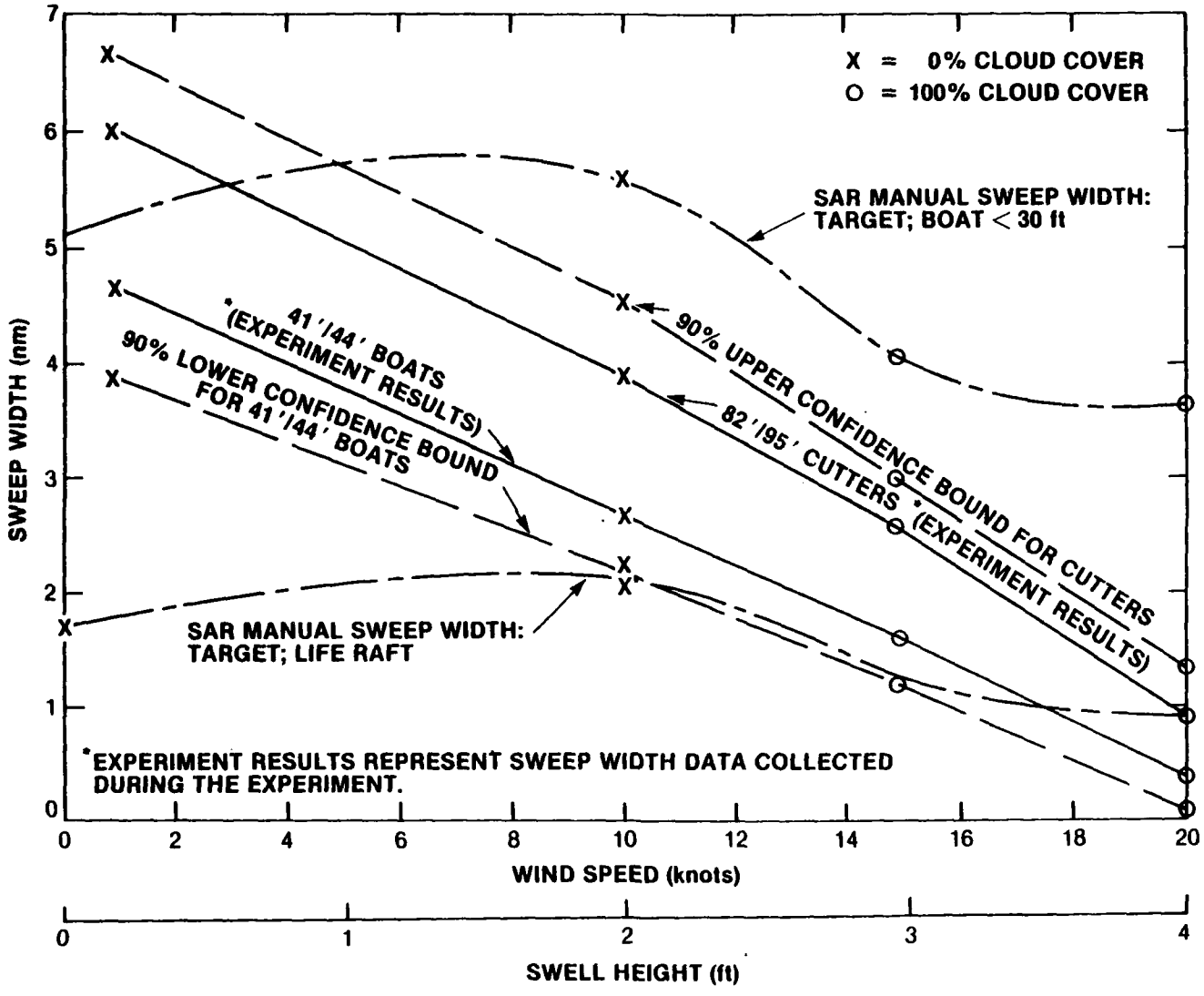


FIGURE 3-14. COMPARISON OF SURFACE CRAFT RESULTS FOR 16-FOOT BOAT TARGETS WITH SAR MANUAL SWEEP WIDTH TABLES

3.6.2 Comparison of Surface Craft Results for Life Rafts with SAR Manual Sweep Width Tables. Figure 3-15 illustrates the effect which visibility has on experimental sweep width predictions under otherwise moderate environmental conditions and includes the corresponding SAR Manual predictions for comparison. It can be seen that the experimental results indicate a more rapid increase in sweep width as visibility improves than does the SAR Manual. Although the SAR Manual visual detection model gives a representative sweep width value for surface units searching for life rafts, it is evident that a range of detection performance exists. The experimental sweep width values for 41 and 44-foot boats equal or exceed SAR Manual predictions at high visibility while cutter sweep width values are consistently much larger than predicted in the SAR Manual. From tables 3-6 and 3-7, it is apparent that there are marked differences in SRU type, target type and target color, and these differences should be taken into consideration when calculating sweep widths.

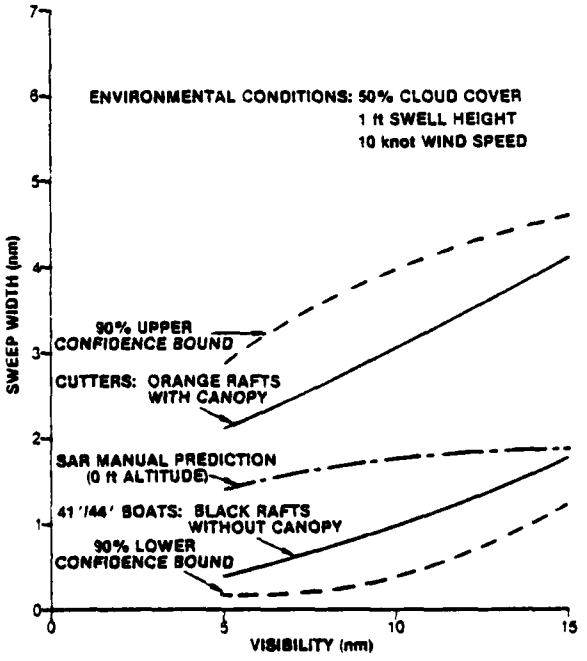
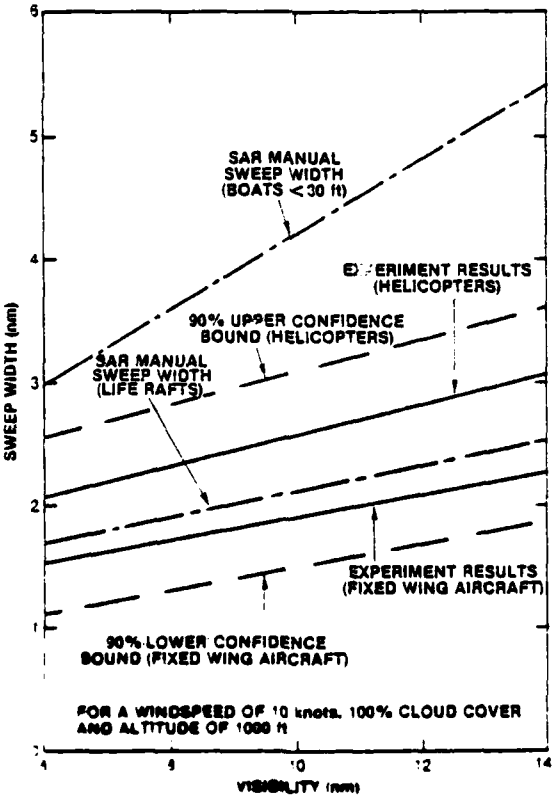


FIGURE 3-15. COMPARISON OF SURFACE CRAFT SEARCHING FOR RAFTS WITH SAR MANUAL PREDICTIONS

3.6.3 Comparison of Aircraft Results for 16-Foot Boat Targets with SAR Manual Sweep Width Tables. Figure 3-16 shows a comparison of experiment results for fixed wing aircraft and helicopters with SAR Manual sweep width table values for boats under 30 feet in length and life rafts. Note that experimental results for the range of environmental conditions experienced bracket the present sweep width predictions for life rafts, with helicopters having slightly larger estimated sweep widths than fixed wing aircraft.

Figure 3-16 also shows that present SAR Manual sweep width predictions for aircraft searching for boats under 30 feet in length are as much as twice those predicted from experimental data.



[illegible] OF AIRCRAFT RESULTS WITH SAR MANUAL SWEEP [illegible] 30A' 'ARGETS)

3.6.4 Comparison of Aircraft Results for Life Rafts with SAR Manual Predictions. Figure 3-17 again illustrates that, as with 16-foot boat targets, sweep widths for aircraft searching for life rafts increase steadily as wind speed and swell height decrease. As mentioned previously in Section 3.6.1, this result is not in agreement with the SAR Manual, which predicts a slight decrease in sweep width as wind speed approaches zero. No substantial differences in performance were found between helicopters and fixed wing aircraft for this data base. These experimental results come closest to being consistent with the SAR Manual sweep width tables.

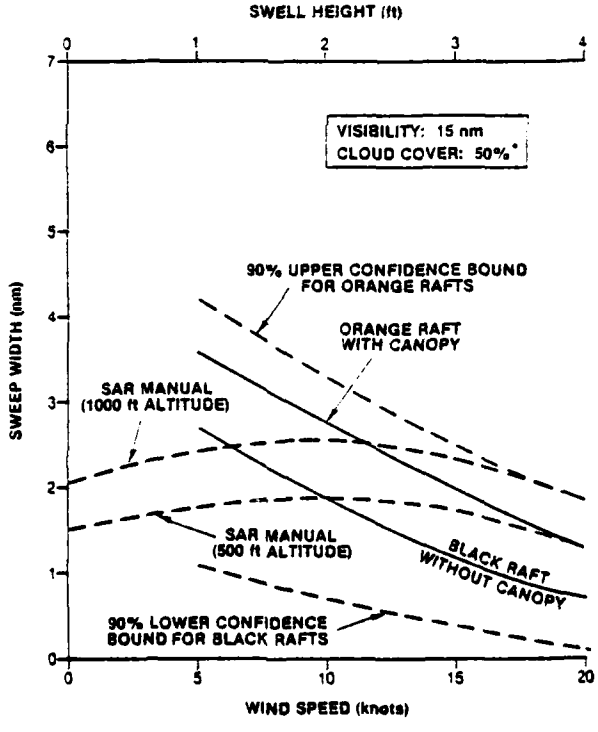


FIGURE 3-17. COMPARISON OF AIRCRAFT SEARCHING FOR RAFTS WITH SAR MANUAL PREDICTION

CHAPTER 4
CONCLUSIONS AND RECOMMENDATIONS

4.0 CONCLUSIONS

4.1 Conclusions Concerning Primary Independent Variables

Based upon the results presented in Chapter 3, the following conclusions were drawn concerning the primary independent variables identified in Section 1.3.1.

1. SRU Type

The type of search unit was found to be a significant parameter in determining sweep width. Helicopters outperformed fixed wing aircraft (except for life raft targets where a relatively small data base may preclude identification of such differences) and cutters consistently outperformed SAR boats. The sweep width tables of the SAR Manual (see Appendix B) give only one sweep width for surface vessel search and a sweep width for each of three different altitudes of aircraft search under any set of environmental conditions. Performance differences among search unit types are indicative of unit characteristics and such distinction should be addressed in a visual detection model.

2. Target Type and Color

Larger targets, those with silhouettes which float higher out of the water, are sighted at farther distances than those with low free boards. As well as target type, color was found to influence the detectability of both 16-foot boat and life raft targets, with the lighter, brighter colored targets being more detectable than darker colored targets. As an example, listed below are 82'/95' cutter sweep width estimates for the

five different combinations of target type/color for similar environmental conditions*.

Target Type/Color	Sweep Width (nm)
Orange canopy raft	3.1
White 16-foot boat	2.8
Orange raft w/o canopy	2.6
Black raft w/o canopy	2.2
Blue 16-foot boat	2.1

3. Visibility and Cloud Cover

The SAR Manual sweep width tables predict a continuing and substantial increase in sweep width as visibility increases from 5 to 50 nautical miles. The sweep width for a surface craft searching for a boat less than 30 feet is predicted to increase from 3.9 to 5.3 nautical miles as visibility increases from 10 to 20 nautical miles. The experimental results for surface craft searching for 16-foot boats (642 detection opportunities) indicate that visibility was not a significant parameter in explaining variability in sweep width for visibilities from 5 to 20 nautical miles. In general, it seems that if the meteorlogical visibility is greater than about twice the sweep width, then additional improvements in visibility would have minimal effects on sweep width. The effects of changes in cloud cover on sweep width (30 to 40 percent increase in sweep width as cloud cover goes from 100 to 0 percent) were found to be less than that predicted by the SAR Manual (57 percent increase in sweep width as cloud cover goes from 100 to 0 percent).

*10 knots wind, 2 feet swell, 100 percent cloud cover, 15 nm visibility.

4. Aircraft Altitude

The SAR Manual sweep width tables predict an increase in sweep width with an increase in aircraft altitude from 500 to 1000 feet for life rafts and boats less than 30 feet over environmental conditions representative of these experiments (see Appendix B). The influence of altitude on sweep width was only evaluated in these experiments for life rafts, and for altitudes of 500 and 1000 feet. For these conditions, aircraft altitude was not identified as a significant parameter. Based upon these results, the authors question the validity of the SAR Manual prediction for 10 nautical mile visibility of a 17 percent improvement in aircraft sweep width at 1000 feet versus 500 feet altitude (2.1 versus 1.8 nm sweep width) and particularly for 15 nautical mile visibility of 37 percent improvement in aircraft sweep width at 1000 feet versus 500 feet altitude (2.6 versus 1.9 nm sweep width).

5. Search Speed

Since an increase in search speed was not found to degrade search performance, cutters, SAR boats, and helicopters should search for 16-foot boats at the maximum speed that environmental conditions will permit (good platform stability and good search visibility maintained). This will minimize the time required to search a particular area with a given probability of detection. In contrast, for fixed wing aircraft, an increase in search speed was found to reduce sweep width (all other things remaining the same). So for fixed wing aircraft, while a higher search speed will reduce the time required to search a given area (for a fixed track spacing), the probability of detection of a 16-foot boat in that area will also be reduced. Based upon Figure 3-11, the aircraft search rate (sweep width times speed) is relatively insensitive to changes in aircraft speed for speeds from 120 to 200 knots (432 to

450 nm^2 per hour). Therefore, the choice of fixed wing aircraft search speed should be made on other considerations such as endurance, comfort, and controllability.

6. Time on Task

The degradation of surface craft and helicopter performance over the course of a search was significant. For surface craft after five hours of search under poor conditions, sweep width was reduced nearly 50 percent (see Figure 3-6). Helicopters searching for 16-foot boats exhibited a similar reduction in performance over a three hour search (see Figure 3-12). This dramatic reduction in sweep width as a search progresses underscores the necessity for understanding the human factors that contribute to this reduction, so that if possible, the effect can be reduced.

7. Wind Speed and Swell Height

The SAR Manual (Reference 1) predicts an increase in visual sweep width as wind speed increases from 0 to 10 knots, followed by a continued decrease in sweep width as wind speed increases above 10 knots (see Appendix B). The SAR Manual explains these results by stating that "with small targets on glassy seas .... difficulty will be experienced in detection due to the reflections of sun, sky, and clouds on the sea surface." Empirical data from these experiments supports a continual reduction in sweep width as wind speed increases (see Table 4-1). Thus, if the SAR Manual visual sweep width tables are revised, a correction factor which results in a continual decrease in sweep width with increasing wind speed is recommended. While there was a strong correlation during these experiments between wind speed and swell height, a significantly better model fit was obtained by considering

TABLE 4-1. INFLUENCE OF WIND SPEED ON P(x) FOR SURFACE CRAFT (BOAT TARGETS)

WIND SPEED (knots)	LATERAL RANGE (nm)				
	0-1	1-2	2-3	3-4	> 4
0-5	(26/28) 0.93	(17/24) 0.71	(6/19) 0.32	(4/21) 0.18	(2/26) 0.08
5-10	(35/41) 0.85	(23/41) 0.56	(9/25) 0.36	(1/16) 0.06	(1/14) 0.07
10-15	(34/42) 0.81	(14/34) 0.41	(8/25) 0.32	(1/16) 0.06	(1/8) 0.12
15-20	(7/14) 0.50	(1/8) 0.12	(0/6) 0.0	(0/1) 0.0	(0/1) 0.0

NOTE: The number in parentheses is the ratio of detections/opportunities; the number below is the ratio as a fraction.

both wind speed and swell height, so that it is felt that the SAR Manual sweep width tables could be improved by considering swell height in addition to wind speed for predictions.

8. Elevation of the Sun

"First-light" and "last-light" searches were conducted in an effort to determine the point at which visual search becomes ineffective. To address this question, data was analyzed from all searches involving raft targets in which the sun's elevation was 20 degrees or less. Although the data is limited, the results, presented in Table 4-2 suggest that effective visual search may be constrained to the hours between sunrise and sunset. However, if the position of the target is fixed and known within about a 0.5 nautical mile radius (approximately the mean sighting range for elevations of zero degrees or less), the

TABLE 4-2. EFFECTS OF LATERAL RANGE AND SUN ELEVATION ON EMPIRICAL SUCCESS RATIO

SUN ELEVATION (degrees)	LATERAL RANGE (nm)		
	0-1	1-2	>2
≤0	(7/8) 0.875	(0/11) 0.000	(0/7) 0.000
0-10	(14/20) 0.700	(3/8) 0.375	(2/8) 0.250
10-20	(20/23) 0.870	(3/15) 0.200	(1/10) 0.100

NOTE: The number in parentheses is the ratio of detections/opportunities; the number below is the ratio as a fraction.

data suggests it may be worthwhile to extend the search until the darker limit of civil twilight* (up to 40 minutes after sunset, depending on the season).

If more precise answers are desired, further investigation may be warranted.

4.2 General Conclusions

1. For poor environmental conditions, the empirical results and computed P(x) versus lateral range curves show a very rapid degradation in detection performance with lateral range.

*The darker limit of civil twilight as defined in Dutton's Piloting and Navigation is the time at which the center of the sun is 6° below the horizon.

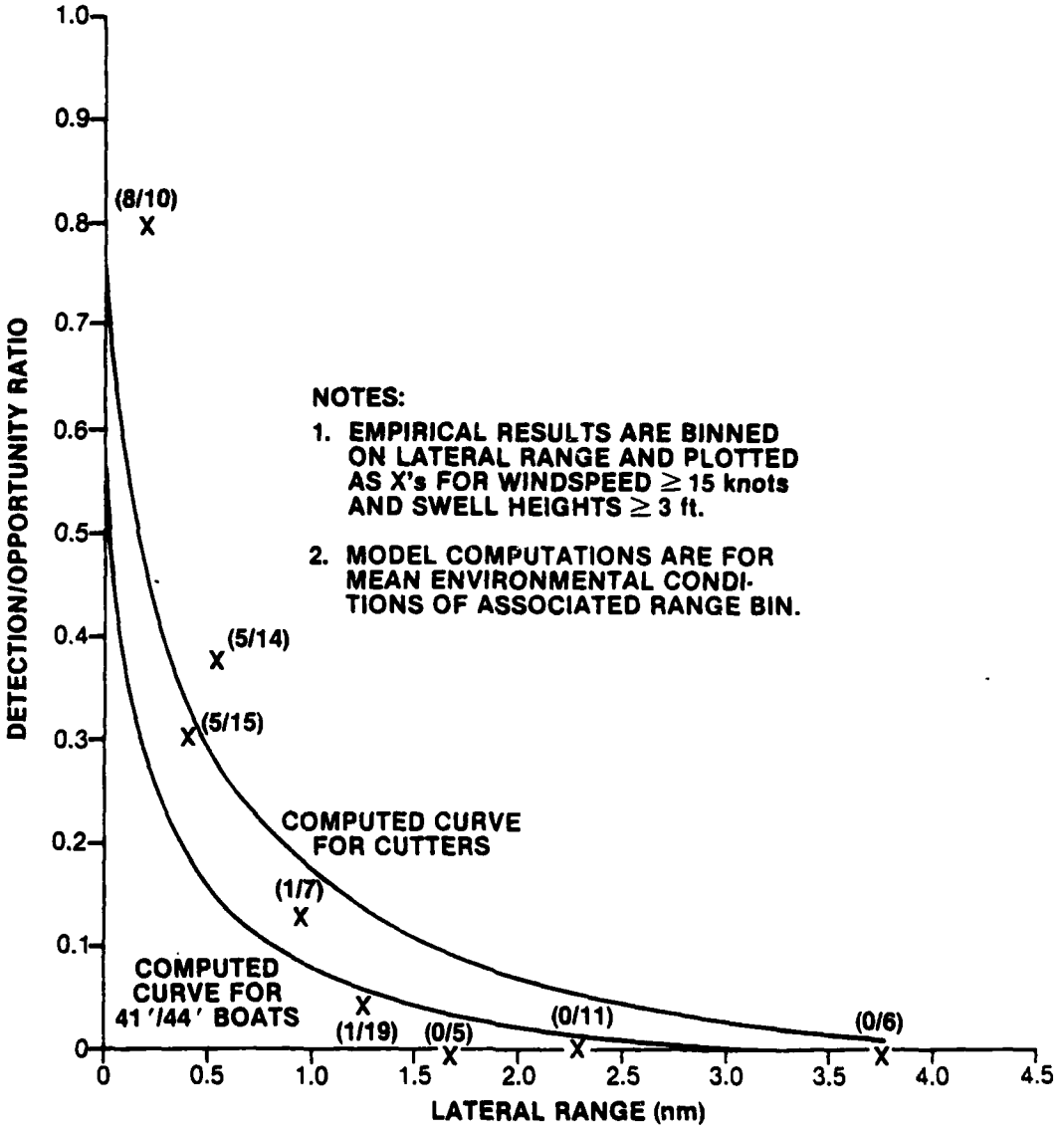


FIGURE 4-1. P(x) VERSUS LATERAL RANGE CURVES FOR SURFACE CRAFT UNDER POOR ENVIRONMENTAL CONDITIONS (16-FOOT BOAT TARGETS)

Figure 4-1 shows the results and model predictions for surface craft searching for 16-foot boats for wind speeds greater than or equal to 15 knots and swell heights greater than or equal to 3 feet. Of 41 opportunities at lateral ranges greater than 1 nautical mile only one boat was detected, while only 41 percent (19 of 46) of the boats with lateral ranges less than or equal to 1 nautical mile were detected. These results are consistent with the model computations shown in Figure 4-1.

These rapidly degrading probabilities of detection with lateral range may not be consistent with the probability of detection versus coverage factor curves of the SAR Manual, (see Appendix B), which are based upon the assumptions that: (a) the instantaneous probability of detection is inversely proportional to the cube of the range of the target; (b) the searcher precisely navigates the assigned tracks; and (c) the tracks provide a uniform coverage of the search area. A comparison of the probability of detection results of these experiments with the POD versus coverage factor model of the SAR Manual will be the subject of a forthcoming report.

A related question of the influence of navigational inaccuracies on the probability of detection versus coverage factor curve would appear to warrant additional study.

As presented in Chapter 2, the navigation inaccuracies of the SRUs in these experiments were quite often in excess of 0.5 nautical mile. This combined with the rapid degradation in $P(x)$ with lateral range for poor conditions ($P(x) < 0.25$ for lateral range > 0.5 nm) would indicate that the expected coverage of a search area would not be uniform (i.e., significant "holes" in the coverage). One method that could be used to quantify the extent and nature of these holes would be to characterize SRU navigation inaccuracies from the experimental data

and use these characteristics as an input to a stochastic simulation model that could "Monte Carlo" these inaccuracies and compare results where SRUs precisely follow assigned tracks to those with characteristic navigation inaccuracies.

2. After four experiments, it seems clear that collection of substantial data for environmental conditions where visibility is less than about three nautical miles, wind speeds greater than 25 knots, or swell height greater than four feet may not be readily available because:

a. these conditions occur relatively infrequently,

b. aircraft missions are generally cancelled due to low ceilings on poor visibility days, and

c. placement and recovery of targets is more difficult and the likelihood of damage/loss of targets is increased in rough seas.

Therefore, it would appear advisable to expend some analytical effort to develop predictions on detection performance for these marginal environmental conditions, and make further attempts to collect empirical data for these conditions as the opportunity arises. Through a combination of the detection predictions developed from these experiments, the existing SAR manual predictions, and understanding of the visual detection process, it is felt that reasonable estimates of SRU visual detection performance could be developed. It is noted that sweep width estimates for the extremes of environmental conditions experienced in the data bases are generally 0.9 nautical mile or less so that estimates for more extreme conditions should not be in error by more than about 0.3 nautical mile.

4.3 Recommendations for Future Experiment Design

Based upon the fall 1978 experiment results (Reference 2), several specific recommendations for experiment design were implemented during subsequent experiments and found to be beneficial. The following are additional recommendations.

4.3.1 Reconstruction of Searcher Tracks. The MRS proved to be an accurate and generally reliable means of reconstructing the searcher tracks and determining target positions. The MRS was not available for HC-130 aircraft due to difficulties in mounting responders on the aircraft. As a result, reconstruction accuracy suffered and the time necessary to reconstruct HC-130 tracks was increased. Thus, it is recommended that every effort be made for future experiments to have the MRS available to monitor the tracks of all search units.

More automation in reconstruction could be provided by recording the MRS output on magnetic tape for direct input to a computer. (This modification to MRS operation should be forthcoming in subsequent experiments.)

4.3.2 Aircraft Search Area. The search area available for these experiments (about 300 square nautical miles) is relatively small compared to open ocean areas typically assigned to fixed wing aircraft. Additionally, the area has a heavy density of small aircraft traffic which causes air crews to be distracted from search duties to perform continual safety scans. Thus, for aircraft searches it would be preferable to have available a larger geographic area that was relatively free of interfering air traffic.

4.3.3 Scope of Future Efforts. In order to develop an accurate computerized search planning model and to make comprehensive recommendations on changes to the National Search and Rescue Manual visual sweep width tables, additional experiments with the following types of SAR targets should be conducted:

1. Life rafts
2. Persons in the water (PIW)
3. 30-foot boats
4. 45-foot boats

Because the data collected to date for other target types can be used to aid in prediction of environmental effects on these targets, somewhat smaller data bases for the targets listed above are probably acceptable. Considerations such as these should be included in future experiment design and planning..

CHAPTER 5
REFERENCES

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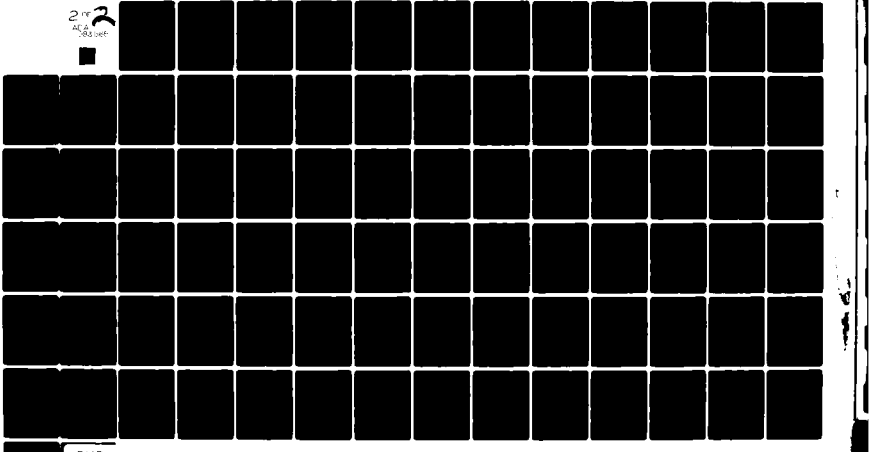

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APPENDIX A
RAW DATA

A.1 INTRODUCTION

This appendix contains raw data files for individual units on a daily basis. These files were used to form the aggregate files used in the LOGODDs computer runs. The following is a key to the format of the raw data files:

Column 1: Detection (1 = Yes, 0 = No)
Column 2: Lateral Range (Nautical Miles)
Column 3: Time on Task (Hours)*
Column 4: Meteorological Visibility (Nautical Miles)
Column 5: Wind Velocity (Knots)
Column 6: Cloud Cover (1/10ths)
Column 7: Swell Height (Feet)
Column 8: Unit Speed (Knots)
Column 9: (Aircraft Files): Altitude (Feet)
Column 9: (Surface Craft Files) } Elevation of Sun (Degrees)
Column 10: (Aircraft Files) }
Column 10: (Surface Craft Files) } Target Type:**
Column 11: (Aircraft Files) }

For 16-foot boat data
1 indicates blue color
-1 indicates white color

For life raft data
0 indicates black raft without canopy
1 indicates orange raft without canopy
2 indicates orange raft with canopy

*In Reference 2, duration of search was used vice time on task. Duration of search was defined as the time that an SRU spent searching for targets on each individual search.

**Not included in fall 1978 data files because all targets were 16-foot white boats in that experiment.

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1	0.50	1.10	20.00	15.00	0.20	3.00	10.50	49.00
1	0.20	1.50	20.00	15.00	0.20	3.00	10.50	53.00
0	1.00	3.20	20.00	12.00	0.20	3.00	10.50	52.00
0	0.60	5.50	20.00	8.00	0.10	2.00	10.50	34.00
0	0.80	5.70	20.00	8.00	0.10	2.00	10.50	32.00

PT. KNOLL - 13 SEPT 78

0	0.97	0.10	20.00	18.00	0.30	3.00	15.00	44.00
1	0.25	1.80	20.00	15.00	0.20	3.00	15.00	53.00
1	1.00	2.20	20.00	15.00	0.20	3.00	15.00	53.00
1	1.10	3.10	20.00	12.00	0.20	3.00	8.00	50.00
1	1.30	3.60	20.00	20.00	0.10	2.00	8.00	47.00
0	1.40	4.00	20.00	10.00	0.10	2.00	8.00	43.00
0	1.70	4.60	20.00	8.00	0.10	2.00	8.00	39.00
1	0.00	5.70	20.00	8.00	0.10	2.00	8.00	27.00
0	5.00	2.20	20.00	15.00	0.20	3.00	15.00	53.00
0	5.20	0.10	20.00	18.00	0.30	3.00	15.00	44.00

PT. TURNER - 13 SEPT 78

0	2.20	0.50	20.00	18.00	0.30	3.00	15.00	43.00
0	1.40	1.30	20.00	15.00	0.30	3.00	15.00	48.00
0	0.30	1.60	20.00	15.00	0.30	3.00	15.00	50.00
0	1.30	2.20	20.00	12.00	0.20	3.00	15.00	52.00
1	0.30	2.70	20.00	12.00	0.20	3.00	15.00	50.00
1	0.25	4.70	20.00	12.00	0.20	2.00	17.00	43.00
1	1.60	5.00	20.00	8.00	0.10	2.00	17.00	41.00
1	0.75	6.00	20.00	8.00	0.10	2.00	17.00	31.00
1	2.80	1.30	20.00	12.00	0.20	3.00	15.00	52.00
0	2.30	2.80	20.00	15.00	0.20	3.00	15.00	53.00
0	2.60	5.60	20.00	8.00	0.10	2.00	17.00	35.00
0	3.05	0.80	20.00	18.00	0.30	3.00	15.00	45.00
0	4.00	5.40	20.00	8.00	0.10	2.00	17.00	37.00

HH3 14 SEPT 78

0	3.50	0.13	25.00	15.00	0.20	2.00	80.00	500.00	42.00
1	3.80	0.45	25.00	15.00	0.20	2.00	80.00	500.00	44.00
1	1.00	0.72	25.00	15.00	0.20	2.00	80.00	500.00	46.00
0	2.10	1.73	25.00	15.00	0.20	2.00	80.00	1000.00	51.00
1	1.50	1.75	25.00	15.00	0.20	2.00	80.00	1000.00	51.00
0	2.80	1.85	25.00	15.00	0.20	2.00	80.00	1000.00	52.00
0	2.60	2.03	25.00	15.00	0.20	2.00	80.00	1000.00	52.00
0	4.30	1.95	25.00	15.00	0.20	2.00	80.00	1000.00	52.00
0	2.20	2.10	25.00	15.00	0.20	2.00	80.00	500.00	48.00
1	2.00	2.20	25.00	15.00	0.20	2.00	80.00	500.00	48.00
0	5.00	2.30	25.00	15.00	0.20	2.00	80.00	500.00	47.00
1	4.80	2.40	25.00	15.00	0.20	2.00	80.00	500.00	46.00
0	5.60	2.50	25.00	15.00	0.20	2.00	80.00	500.00	46.00
1	2.40	2.50	25.00	15.00	0.20	2.00	80.00	1000.00	45.00
1	0.90	2.70	25.00	15.00	0.20	2.00	80.00	1000.00	44.00
0	5.00	2.80	25.00	15.00	0.20	2.00	80.00	1000.00	44.00

HH52A 14 SEPT 78

0	4.20	0.17	25.00	15.00	0.20	2.00	85.00	500.00	51.00
0	6.50	0.30	25.00	15.00	0.20	2.00	85.00	500.00	52.00
0	3.80	0.42	25.00	15.00	0.20	2.00	85.00	500.00	52.00
1	0.75	0.50	25.00	15.00	0.20	2.00	85.00	500.00	52.00
0	0.80	0.67	25.00	15.00	0.20	2.00	85.00	500.00	52.00
0	6.70	1.50	25.00	15.00	0.20	2.00	55.00	1000.00	50.00
1	0.75	1.87	25.00	15.00	0.20	2.00	55.00	1000.00	49.00
0	2.00	1.93	25.00	15.00	0.20	2.00	55.00	1000.00	49.00
1	0.50	1.98	25.00	15.00	0.20	2.00	55.00	1000.00	48.00
0	4.20	2.05	25.00	15.00	0.20	2.00	55.00	1000.00	48.00

41441 18 SEPT 78

1	0.80	0.00	4.50	10.00	1.00	1.50	15.00	47.00
0	1.80	0.15	4.50	10.00	1.00	1.50	15.00	48.00
0	1.20	0.25	4.50	10.00	1.00	1.50	15.00	48.00
1	0.50	3.80	6.00	10.00	1.00	2.50	8.00	37.00
1	0.50	4.15	6.00	10.00	1.00	2.50	8.00	33.00
1	0.00	4.33	6.00	10.00	1.00	2.50	8.00	32.00
0	1.10	4.23	6.00	10.00	1.00	2.50	8.00	33.00
0	2.20	4.00	6.00	10.00	1.00	2.50	8.00	41.00

44348 18 SEPT 78

1	0.85	0.65	5.00	12.50	1.00	2.00	10.00	35.00
0	3.90	0.45	5.00	12.50	1.00	2.00	10.00	34.00

PT. JACKSON - 18 SEPT 78

1	3.00	0.13	5.00	7.00	1.00	1.50	15.00	48.00
0	5.80	0.47	5.00	7.00	1.00	1.50	15.00	50.00
0	7.20	0.40	5.00	7.00	1.00	1.50	15.00	49.00
1	0.85	1.00	5.00	7.00	1.00	1.50	15.00	50.00
0	1.70	1.07	3.00	7.00	1.00	1.50	15.00	50.00
1	1.50	1.05	3.00	7.00	1.00	1.50	15.00	50.00
0	0.75	2.65	10.00	9.00	1.00	2.00	8.00	45.00
1	0.75	2.83	10.00	9.00	1.00	2.00	8.00	44.00
0	1.00	2.93	10.00	9.00	1.00	2.00	8.00	43.00
0	4.50	3.31	10.00	9.00	1.00	2.00	8.00	40.00
0	1.25	3.40	10.00	9.00	1.00	2.00	8.00	40.00
0	2.25	3.70	10.00	9.00	1.00	2.00	8.00	37.00

FT WELLS 18 SEPT 78

1	0.20	0.50	2.00	12.00	1.00	1.00	12.00	50.00
0	5.60	0.45	2.00	12.00	1.00	1.00	12.00	50.00
0	2.80	0.56	2.00	12.00	1.00	1.00	12.00	50.00
0	1.40	0.93	2.00	12.00	1.00	1.00	12.00	50.00
1	1.00	1.01	2.00	12.00	1.00	1.00	12.00	50.00
1	0.25	1.15	8.00	12.00	1.00	1.00	12.00	49.00
1	2.20	1.15	8.00	12.00	1.00	1.00	12.00	49.00
0	2.50	2.41	10.00	12.00	1.00	2.00	12.00	43.00
1	0.20	2.53	10.00	12.00	1.00	2.00	12.00	42.00
0	2.50	2.70	10.00	12.00	1.00	2.00	12.00	40.00
1	0.00	2.80	10.00	12.00	1.00	2.00	12.00	40.00
0	2.85	5.13	5.00	12.00	1.00	2.00	12.00	37.00
0	1.40	5.48	5.00	12.00	1.00	2.00	12.00	34.00
0	5.10	5.51	5.00	12.00	1.00	2.00	12.00	34.00

HC130 20 SEPT 78

0	3.60	0.50	15.00	3.00	0.00	2.00	150.00	1000.00	38.00
0	3.60	0.60	15.00	3.00	0.00	2.00	150.00	1000.00	38.00
1	0.40	0.60	15.00	3.00	0.00	2.00	150.00	1000.00	38.00
1	1.10	0.60	15.00	3.00	0.00	2.00	150.00	1000.00	39.00
0	3.60	0.70	15.00	3.00	0.00	2.00	150.00	1000.00	39.00
0	4.10	0.70	15.00	3.00	0.00	2.00	150.00	1000.00	39.00
0	1.10	0.12	15.00	2.00	0.00	1.50	200.00	1000.00	42.00
0	2.70	0.13	15.00	2.00	0.00	1.50	200.00	1000.00	42.00
0	2.70	0.15	15.00	2.00	0.00	1.50	200.00	1000.00	42.00
1	0.30	0.17	15.00	2.00	0.00	1.50	200.00	1000.00	42.00
1	1.20	0.25	15.00	2.00	0.00	1.50	200.00	1000.00	43.00
0	0.90	3.60	15.00	5.00	0.00	1.00	150.00	1000.00	44.00
0	3.00	3.60	15.00	5.00	0.00	1.00	150.00	1000.00	44.00
1	3.00	3.60	15.00	5.00	0.00	1.00	150.00	1000.00	44.00
0	2.65	3.60	15.00	5.00	0.00	1.00	150.00	1000.00	44.00
0	1.50	3.70	15.00	5.00	0.00	1.00	150.00	1000.00	44.00
0	5.20	3.60	15.00	5.00	0.00	1.00	150.00	1000.00	45.00
1	2.20	3.80	15.00	5.00	0.00	1.00	150.00	1000.00	43.00
0	1.30	3.80	15.00	5.00	0.00	1.00	150.00	1000.00	43.00
1	1.40	4.10	15.00	5.00	0.00	1.00	200.00	1000.00	41.00
1	0.90	4.10	15.00	5.00	0.00	1.00	200.00	1000.00	41.00
0	2.20	4.10	15.00	5.00	0.00	1.00	200.00	1000.00	41.00
0	3.00	4.20	15.00	5.00	0.00	1.00	200.00	1000.00	40.00
0	5.50	4.10	15.00	5.00	0.00	1.00	200.00	1000.00	40.00

MH3 20 SEPT 78

1	1.25	0.10	15.00	2.00	0.00	2.00	90.00	500.00	41.00
0	4.40	0.10	15.00	2.00	0.00	2.00	90.00	500.00	40.00
1	2.70	0.20	15.00	2.00	0.00	2.00	90.00	500.00	42.00
1	0.60	0.30	15.00	2.00	0.00	2.00	90.00	500.00	42.00
0	5.20	0.30	15.00	2.00	0.00	2.00	90.00	500.00	43.00
1	1.00	0.30	15.00	2.00	0.00	2.00	90.00	500.00	43.00
0	4.30	0.40	15.00	2.00	0.00	2.00	90.00	500.00	44.00
1	2.10	0.50	15.00	2.00	0.00	2.00	90.00	500.00	44.00
1	0.80	0.60	15.00	5.00	0.00	2.00	90.00	500.00	46.00
0	5.20	0.70	15.00	5.00	0.00	1.50	60.00	500.00	47.00
1	2.60	0.80	15.00	5.00	0.00	1.50	60.00	500.00	47.00
1	0.10	0.90	15.00	5.00	0.00	1.50	60.00	500.00	47.00
1	0.75	1.10	15.00	5.00	0.00	1.50	90.00	500.00	45.00
0	3.90	1.30	15.00	5.00	0.00	1.50	90.00	500.00	44.00
1	0.80	1.30	15.00	5.00	0.00	1.50	90.00	500.00	44.00
0	1.60	1.80	15.00	5.00	0.00	1.50	90.00	500.00	40.00
1	2.00	1.50	15.00	5.00	0.00	1.50	90.00	500.00	42.00
0	1.70	1.60	15.00	5.00	0.00	1.50	90.00	500.00	42.00
0	1.40	1.80	15.00	7.00	0.00	1.50	60.00	500.00	40.00
1	1.00	1.90	15.00	7.00	0.00	1.50	60.00	500.00	40.00
1	1.60	1.90	15.00	7.00	0.00	1.50	60.00	500.00	39.00
0	3.75	1.90	15.00	7.00	0.00	1.50	60.00	500.00	39.00
0	1.80	2.00	10.00	7.00	0.00	1.50	60.00	500.00	38.00
0	1.50	1.80	15.00	7.00	0.00	1.50	60.00	500.00	40.00
1	1.50	1.90	15.00	7.00	0.00	1.50	60.00	500.00	39.00

HH52A 20 SEPT 78

1	1.70	0.22	15.00	5.00	0.00	1.50	85.00	750.00	50.00
1	0.20	0.32	15.00	5.00	0.00	1.50	85.00	750.00	50.00
0	4.50	0.45	15.00	5.00	0.00	1.50	85.00	750.00	50.00
0	1.50	0.45	15.00	5.00	0.00	1.50	85.00	750.00	50.00
1	2.25	0.53	15.00	5.00	0.00	1.50	85.00	750.00	49.00
1	1.60	0.60	15.00	5.00	0.00	1.50	60.00	750.00	49.00
0	2.00	0.80	15.00	5.00	0.00	1.50	85.00	750.00	48.00
1	0.80	1.00	15.00	5.00	0.00	1.50	85.00	750.00	47.00
1	2.60	0.90	15.00	5.00	0.00	1.50	85.00	750.00	48.00
1	0.50	1.30	10.00	7.00	0.00	1.50	85.00	750.00	34.00
0	0.00	1.40	10.00	10.00	0.00	1.50	85.00	750.00	33.00
0	2.30	1.50	10.00	10.00	0.00	1.50	85.00	750.00	32.00
0	4.00	1.50	10.00	10.00	0.00	1.50	85.00	750.00	31.00
0	1.70	1.50	10.00	10.00	0.00	1.50	85.00	750.00	31.00
0	3.20	1.60	10.00	10.00	0.00	1.50	85.00	750.00	31.00
0	1.90	1.60	10.00	10.00	0.00	1.50	85.00	750.00	31.00
0	5.20	1.05	10.00	10.00	0.00	1.50	85.00	750.00	48.00

HU16 20 SEPT 78

1	0.10	0.21	15.00	5.00	0.00	1.50	150.00	1250.00	50.00
0	3.50	0.17	15.00	5.00	0.00	1.50	150.00	1250.00	50.00
0	2.75	0.27	15.00	5.00	0.00	1.50	150.00	1250.00	50.00
1	0.55	0.32	15.00	5.00	0.00	1.50	150.00	1250.00	50.00
0	3.40	0.40	15.00	5.00	0.00	1.50	150.00	1250.00	50.00
1	1.58	1.00	10.00	7.00	0.00	1.00	120.00	1250.00	37.00
1	1.45	0.80	10.00	7.00	0.00	1.00	120.00	1250.00	39.00
1	0.60	0.90	10.00	7.00	0.00	1.00	120.00	1250.00	38.00
0	3.20	0.90	10.00	7.00	0.00	1.00	120.00	1250.00	38.00
1	3.30	0.57	15.00	3.00	0.00	1.00	120.00	1250.00	50.00
1	1.60	0.63	15.00	3.00	0.00	1.00	120.00	1250.00	49.00
1	1.75	0.70	15.00	3.00	0.00	1.00	120.00	1250.00	49.00
0	4.70	0.71	15.00	3.00	0.00	1.00	120.00	1250.00	49.00
1	1.10	0.65	15.00	3.00	0.00	1.00	120.00	1250.00	49.00
1	1.75	1.00	10.00	10.00	0.00	1.00	120.00	1250.00	35.00
0	2.75	1.10	10.00	10.00	0.00	1.00	120.00	1250.00	34.00
1	0.65	1.10	10.00	10.00	0.00	1.00	120.00	1250.00	34.00

HC130 21 SEPT 78

0	2.60	0.60	8.00	10.00	0.00	1.50	150.00	1000.00	45.00
0	1.00	0.70	8.00	10.00	0.00	1.50	150.00	1000.00	45.00
0	0.90	0.70	8.00	10.00	0.00	1.50	150.00	1000.00	45.00
0	1.10	0.70	8.00	10.00	0.00	1.50	150.00	1000.00	45.00
0	2.80	0.70	8.00	10.00	0.00	1.50	150.00	1000.00	46.00
1	1.00	0.70	8.00	10.00	0.00	1.50	150.00	1000.00	46.00
1	0.80	0.80	8.00	10.00	0.00	1.50	150.00	1000.00	46.00
0	1.10	0.80	8.00	10.00	0.00	1.50	150.00	1000.00	46.00
0	4.00	0.90	8.00	10.00	0.00	1.50	150.00	1000.00	46.00
1	0.80	0.90	8.00	10.00	0.00	1.50	150.00	1000.00	46.00
0	5.40	3.80	8.00	12.00	0.00	3.00	150.00	1000.00	42.00
1	0.55	3.80	8.00	12.00	0.00	3.00	150.00	1000.00	41.00
0	5.30	3.90	8.00	12.00	0.00	3.00	150.00	1000.00	41.00
0	1.40	3.90	8.00	12.00	0.00	3.00	150.00	1000.00	41.00
0	0.50	4.00	8.00	12.00	0.00	3.00	150.00	1000.00	40.00
0	1.40	4.00	8.00	12.00	0.00	3.00	150.00	1000.00	40.00
0	4.70	3.90	8.00	12.00	0.00	3.00	150.00	1000.00	41.00
0	2.90	4.00	8.00	12.00	0.00	3.00	150.00	1000.00	40.00
1	0.50	4.00	8.00	12.00	0.00	3.00	150.00	1000.00	40.00
0	2.20	4.10	8.00	12.00	0.00	3.00	150.00	1000.00	40.00
0	2.00	0.06	8.00	10.00	0.00	1.50	150.00	1000.00	42.00
0	0.10	0.12	8.00	10.00	0.00	1.50	150.00	1000.00	43.00
1	1.20	0.15	8.00	10.00	0.00	1.50	150.00	1000.00	43.00
0	2.20	0.20	8.00	10.00	0.00	1.50	150.00	1000.00	43.00
0	0.50	0.22	8.00	10.00	0.00	1.50	150.00	1000.00	43.00
1	0.20	0.25	8.00	10.00	0.00	1.50	150.00	1000.00	43.00
0	2.10	0.16	8.00	10.00	0.00	1.50	150.00	1000.00	43.00
0	1.80	3.40	8.00	12.00	0.00	3.00	150.00	1000.00	45.00
0	0.00	3.40	8.00	12.00	0.00	3.00	150.00	1000.00	45.00
0	5.55	3.40	8.00	12.00	0.00	3.00	150.00	1000.00	44.00
0	2.50	3.50	8.00	12.00	0.00	3.00	150.00	1000.00	44.00
1	1.10	3.50	8.00	12.00	0.00	3.00	150.00	1000.00	44.00
0	0.75	3.50	8.00	12.00	0.00	3.00	150.00	1000.00	45.00
0	2.65	3.50	8.00	12.00	0.00	3.00	150.00	1000.00	43.00
0	2.40	3.50	8.00	12.00	0.00	3.00	150.00	1000.00	43.00
1	0.50	3.60	8.00	12.00	0.00	3.00	150.00	1000.00	43.00

HHS2A 21 SEPT 78

0	2.75	0.88	8.00	10.00	0.00	2.00	60.00	500.00	49.00
0	2.10	1.13	8.00	10.00	0.00	2.00	60.00	500.00	48.00
0	0.30	1.23	8.00	10.00	0.00	2.00	60.00	500.00	48.00
0	2.00	1.35	8.00	10.00	0.00	2.00	60.00	500.00	48.00
0	2.10	1.38	8.00	10.00	0.00	2.00	60.00	500.00	48.00
1	0.80	1.38	8.00	10.00	0.00	2.00	60.00	500.00	48.00
0	3.00	1.60	8.00	10.00	0.00	2.00	60.00	500.00	47.00
1	0.50	1.68	8.00	10.00	0.00	2.00	60.00	500.00	46.00
0	3.80	0.23	8.00	10.00	0.00	1.50	85.00	500.00	49.00
1	1.80	0.22	8.00	10.00	0.00	1.50	85.00	500.00	49.00
0	2.00	0.28	8.00	10.00	0.00	1.50	85.00	500.00	49.00
1	0.10	0.33	8.00	10.00	0.00	1.50	85.00	500.00	49.00
0	2.50	0.47	8.00	10.00	0.00	1.50	85.00	500.00	49.00

HH3 21 SEPT 78

1	0.40	1.00	8.00	12.00	0.00	3.00	80.00	500.00	39.00
0	0.40	1.10	8.00	12.00	0.00	3.00	80.00	500.00	38.00
0	1.50	1.30	8.00	12.00	0.00	3.00	80.00	500.00	37.00
1	0.20	1.30	8.00	12.00	0.00	3.00	80.00	500.00	36.00
0	3.75	1.40	8.00	12.00	0.00	3.00	80.00	500.00	36.00
0	1.10	1.40	8.00	12.00	0.00	3.00	80.00	500.00	35.00
0	3.70	1.50	8.00	12.00	0.00	3.00	80.00	500.00	35.00
0	0.40	0.27	8.00	10.00	0.00	1.50	120.00	500.00	42.00
0	6.00	0.32	8.00	10.00	0.00	1.50	120.00	500.00	43.00
1	3.00	0.35	8.00	10.00	0.00	1.50	120.00	500.00	43.00
1	0.75	0.38	8.00	10.00	0.00	1.50	120.00	500.00	43.00
1	1.00	0.60	8.00	10.00	0.00	1.50	120.00	500.00	44.00

PT TURNER - 22 SEPT 78

0	1.10	1.78	10.00	22.00	1.00	4.50	13.00	48.00
1	0.50	2.01	10.00	22.00	1.00	4.50	13.00	47.00
0	0.60	2.18	10.00	22.00	1.00	4.50	13.00	47.00
1	0.40	2.66	10.00	22.00	1.00	4.50	13.00	44.00
0	1.20	2.73	10.00	22.00	1.00	4.50	13.00	44.00
0	3.20	3.11	10.00	22.00	1.00	4.50	13.00	42.00
0	0.50	3.13	10.00	22.00	1.00	4.50	13.00	42.00
0	0.50	3.43	10.00	22.00	1.00	4.50	13.00	39.00
0	1.60	3.61	10.00	22.00	1.00	4.50	13.00	38.00
0	0.20	3.81	10.00	22.00	1.00	4.50	13.00	36.00
0	0.10	3.81	10.00	22.00	1.00	4.50	13.00	36.00
0	1.30	3.96	10.00	22.00	1.00	4.50	13.00	34.00
0	1.10	4.04	10.00	22.00	1.00	4.50	13.00	33.00
0	0.30	4.21	10.00	22.00	1.00	4.50	13.00	32.00
0	2.90	4.28	10.00	22.00	1.00	4.50	13.00	31.00
0	3.10	4.55	10.00	22.00	1.00	4.50	13.00	30.00
0	1.90	4.68	10.00	22.00	1.00	4.50	13.00	28.00
0	1.50	1.95	10.00	22.00	1.00	4.50	13.00	47.00
0	1.50	3.70	10.00	22.00	1.00	4.50	13.00	37.00

PT WELLS 22 SEPT 78

0	1.40	0.05	10.00	25.00	1.00	4.00	12.00	49.00
0	0.65	0.27	10.00	25.00	1.00	4.00	12.00	48.00
0	1.30	0.40	10.00	25.00	1.00	4.00	12.00	47.00
0	1.50	0.65	10.00	25.00	1.00	4.00	12.00	47.00
0	0.50	0.88	10.00	25.00	1.00	4.00	12.00	46.00
0	0.90	0.90	10.00	25.00	1.00	4.00	12.00	46.00
0	0.40	1.02	10.00	25.00	1.00	4.00	12.00	45.00
0	1.00	1.14	10.00	25.00	1.00	5.00	12.00	44.00
0	0.30	1.26	10.00	22.00	1.00	5.00	12.00	44.00
0	2.80	1.48	10.00	25.00	1.00	5.00	12.00	42.00
0	1.70	1.93	10.00	25.00	1.00	5.00	12.00	39.00
0	1.00	2.43	10.00	25.00	1.00	5.00	12.00	36.00
1	0.65	2.63	10.00	25.00	1.00	5.00	12.00	33.00
1	0.30	2.96	10.00	21.00	1.00	4.00	12.00	30.00
1	0.50	3.09	10.00	21.00	1.00	4.00	12.00	29.00
0	0.70	3.22	10.00	21.00	1.00	4.00	12.00	28.00
0	2.10	2.65	10.00	21.00	1.00	4.00	12.00	33.00
0	2.20	2.55	10.00	21.00	1.00	4.00	12.00	34.00

41342 - 25 SEPT 78

1	0.28	0.07	10.00	13.00	0.00	1.50	10.00	46.00
1	2.25	0.10	10.00	13.00	0.00	1.50	10.00	46.00
1	1.10	0.13	10.00	13.00	0.00	1.50	10.00	46.00
0	2.20	0.71	10.00	13.00	0.00	1.50	10.00	47.00
0	1.50	1.08	10.00	13.00	0.00	1.50	10.00	47.00
0	1.70	1.36	10.00	13.00	0.00	1.50	10.00	47.00
1	0.10	1.38	10.00	13.00	0.00	1.50	10.00	47.00
0	2.70	1.63	10.00	13.00	0.00	1.50	10.00	45.00
0	1.20	1.83	10.00	13.00	0.00	1.50	10.00	44.00
0	1.50	1.96	10.00	13.00	0.00	1.50	10.00	43.00
1	0.80	2.17	10.00	13.00	0.00	1.50	10.00	42.00
1	4.40	2.30	10.00	13.00	0.00	1.50	10.00	42.00
1	2.45	2.30	10.00	13.00	0.00	1.50	10.00	42.00
0	6.75	2.22	10.00	13.00	0.00	1.50	10.00	42.00
0	4.10	3.22	10.00	13.00	0.00	1.50	20.00	35.00
1	2.45	2.57	10.00	13.00	0.00	1.50	20.00	40.00
0	4.50	2.63	10.00	13.00	0.00	1.50	20.00	40.00
1	1.00	2.62	10.00	13.00	0.00	1.50	20.00	40.00
0	3.30	2.88	10.00	13.00	0.00	1.50	20.00	38.00
1	0.26	2.85	10.00	13.00	0.00	1.50	20.00	38.00
0	3.00	3.02	10.00	13.00	0.00	1.50	20.00	37.00
1	1.45	2.80	10.00	13.00	0.00	1.50	20.00	38.00
0	3.00	3.02	10.00	13.00	0.00	1.50	20.00	37.00
1	0.55	3.03	12.00	11.00	0.00	1.50	20.00	37.00
1	0.95	3.37	15.00	10.00	0.00	1.50	20.00	33.00
0	2.60	3.29	15.00	10.00	0.00	1.50	20.00	34.00
0	3.20	3.42	15.00	10.00	0.00	1.50	20.00	33.00
0	5.40	3.39	15.00	10.00	0.00	1.50	20.00	33.00

41385 -- 25 SEPT 78

1	0.00	0.00	10.00	10.00	0.00	1.50	15.00	39.00
1	1.50	0.13	10.00	10.00	0.00	1.50	15.00	40.00
0	1.10	0.36	10.00	10.00	0.00	1.50	15.00	41.00
0	2.60	0.62	10.00	10.00	0.00	1.50	15.00	42.00
0	4.00	0.77	10.00	10.00	0.00	1.50	15.00	44.00
1	2.80	0.97	10.00	10.00	0.00	1.50	15.00	44.00
1	0.20	1.17	10.00	10.00	0.00	1.50	8.00	45.00
1	1.75	1.37	10.00	13.00	0.00	1.50	8.00	46.00
1	0.75	1.45	10.00	13.00	0.00	1.50	8.00	47.00
0	4.00	1.62	10.00	13.00	0.00	1.50	8.00	47.00
1	0.30	1.87	10.00	13.00	0.00	1.50	8.00	48.00
0	2.50	0.13	10.00	13.00	0.00	1.50	8.00	40.00
0	2.60	2.82	10.00	13.00	0.00	1.50	8.00	48.00
1	1.25	2.95	10.00	13.00	0.00	1.50	8.00	45.00
1	0.50	3.62	10.00	13.00	0.00	1.50	8.00	42.00
0	1.70	3.72	10.00	13.00	0.00	1.50	8.00	41.00
0	3.10	3.72	10.00	13.00	0.00	1.50	8.00	41.00
1	3.40	4.04	10.00	13.00	0.00	1.50	8.00	38.00
0	1.00	4.17	10.00	13.00	0.00	1.50	8.00	38.00
0	1.10	4.27	10.00	13.00	0.00	1.50	8.00	37.00
1	0.75	4.37	10.00	13.00	0.00	1.50	8.00	36.00
0	3.50	4.57	15.00	10.00	0.00	1.50	8.00	35.00
0	1.75	4.79	15.00	10.00	0.00	1.50	8.00	32.00
0	0.20	5.07	15.00	10.00	0.00	1.50	8.00	30.00
0	2.40	4.05	15.00	10.00	0.00	1.50	8.00	38.00

CAPE GEORGE - 25 SEPT 78

1	1.70	0.00	10.00	9.50	0.00	1.50	15.00	42.00
0	3.60	0.20	10.00	9.50	0.00	1.50	15.00	43.00
1	1.20	0.30	10.00	9.50	0.00	1.50	15.00	43.00
1	1.00	0.40	10.00	9.50	0.00	1.50	15.00	44.00
1	3.10	0.60	10.00	9.50	0.00	1.50	15.00	45.00
0	3.60	0.60	10.00	14.00	0.00	1.50	15.00	45.00
1	1.90	0.70	10.00	14.00	0.00	1.50	15.00	46.00
0	5.70	0.80	10.00	14.00	0.00	1.50	15.00	46.00
1	0.00	1.10	10.00	14.00	0.00	1.50	15.00	47.00
0	1.10	1.20	10.00	14.00	0.00	1.50	15.00	47.00
0	3.70	1.20	10.00	14.00	0.00	1.50	15.00	47.00
0	2.75	1.40	10.00	13.50	0.00	1.50	15.00	47.00
1	1.80	1.20	10.00	13.50	0.00	1.50	15.00	47.00
0	2.10	1.50	10.00	13.50	0.00	1.50	8.00	47.00
0	0.80	1.70	10.00	13.50	0.00	1.50	8.00	47.00
1	0.80	2.20	10.00	13.50	0.00	1.50	8.00	46.00
1	0.00	2.40	10.00	13.50	0.00	1.50	8.00	45.00
1	1.40	2.40	10.00	13.50	0.00	1.50	8.00	45.00
1	2.00	2.60	10.00	12.50	0.00	1.50	8.00	44.00
0	3.60	2.70	10.00	12.50	0.00	1.50	8.00	44.00
0	1.00	3.00	10.00	12.50	0.00	1.50	8.00	43.00
1	1.75	3.00	10.00	12.50	0.00	1.50	8.00	43.00
1	1.45	3.40	15.00	10.00	0.00	1.50	8.00	39.00
1	2.70	3.60	15.00	10.00	0.00	1.50	8.00	38.00
0	3.20	1.83	10.00	13.00	0.00	1.50	8.00	47.00
0	1.70	2.00	10.00	13.00	0.00	1.50	8.00	47.00
0	3.50	2.18	10.00	13.00	0.00	1.50	8.00	46.00
0	2.20	2.70	10.00	13.00	0.00	1.50	8.00	44.00

PT KNOLL - 25 SEPT 78

1	0.00	0.13	10.00	10.00	0.00	1.50	8.00	39.00
0	2.30	0.23	10.00	10.00	0.00	1.50	8.00	40.00
0	1.90	0.63	10.00	10.00	0.00	1.50	8.00	42.00
0	4.00	0.75	10.00	10.00	0.00	1.50	8.00	43.00
0	1.85	1.07	10.00	10.00	0.00	1.50	8.00	44.00
0	0.05	1.42	10.00	10.00	0.00	1.50	8.00	46.00
1	2.10	1.52	10.00	14.00	0.00	1.50	8.00	47.00
1	0.40	1.62	10.00	14.00	0.00	1.50	8.00	47.00
1	0.65	1.87	10.00	14.00	0.00	1.50	8.00	47.00
1	1.60	1.87	10.00	14.00	0.00	1.50	8.00	47.00
0	3.90	1.85	10.00	14.00	0.00	1.50	8.00	47.00
1	2.40	2.35	10.00	14.00	0.00	1.50	15.00	46.00
1	0.25	2.70	10.00	14.00	0.00	1.50	15.00	44.00
1	1.20	2.93	10.00	14.00	0.00	1.50	15.00	43.00
0	4.30	2.77	10.00	14.00	0.00	1.50	15.00	44.00
0	1.90	3.11	10.00	11.00	0.00	1.50	15.00	42.00
1	0.50	3.01	10.00	11.00	0.00	1.50	15.00	42.00
1	0.55	3.14	10.00	11.00	0.00	1.50	15.00	42.00
0	2.90	3.27	10.00	11.00	0.00	1.50	15.00	40.00
1	0.15	3.55	10.00	11.00	0.00	1.50	15.00	39.00
0	0.80	3.45	10.00	11.00	0.00	1.50	15.00	39.00
0	3.60	3.78	10.00	11.00	0.00	1.50	15.00	38.00
0	1.85	4.15	10.00	11.00	0.00	1.50	15.00	34.00
0	2.00	2.70	10.00	11.00	0.00	1.50	15.00	44.00
0	3.50	2.95	10.00	11.00	0.00	1.50	15.00	43.00

MHS2A 26 SEPT 78

1	1.50	1.23	15.00	3.00	0.00	1.00	85.00	1000.00	46.00
1	3.90	1.31	15.00	3.00	0.00	1.00	85.00	1000.00	45.00
1	2.00	1.53	15.00	3.00	0.00	1.00	85.00	1000.00	44.00
0	6.25	1.28	15.00	3.00	0.00	1.00	85.00	1000.00	45.00
1	1.75	1.68	15.00	3.00	0.00	1.00	85.00	1000.00	44.00
0	5.00	1.80	15.00	3.00	0.00	1.00	85.00	1000.00	43.00
1	2.75	1.82	15.00	3.00	0.00	1.00	85.00	1000.00	43.00
1	2.00	1.92	15.00	3.00	0.00	1.00	85.00	1000.00	43.00
1	0.75	2.02	15.00	3.00	0.00	1.00	85.00	1000.00	42.00
0	5.75	1.95	15.00	3.00	0.00	1.00	85.00	1000.00	43.00
1	2.80	2.10	15.00	3.00	0.00	1.00	85.00	1000.00	42.00
1	0.70	2.20	15.00	3.00	0.00	1.00	85.00	1000.00	41.00
0	6.60	2.25	15.00	3.00	0.00	1.00	85.00	1000.00	41.00
0	4.30	2.18	15.00	3.00	0.00	1.00	85.00	1000.00	41.00
1	1.10	1.48	15.00	3.00	0.00	1.00	85.00	1000.00	45.00
1	3.20	1.53	15.00	3.00	0.00	1.00	85.00	1000.00	44.00
0	4.70	1.65	15.00	3.00	0.00	1.00	85.00	1000.00	44.00

HU16 26 SEPT 78

1	1.85	0.15	15.00	5.00	0.00	1.00	145.00	1000.00	41.00
0	5.00	0.17	15.00	5.00	0.00	1.00	145.00	1000.00	41.00
1	1.80	0.25	15.00	5.00	0.00	1.00	145.00	1000.00	42.00
0	2.80	0.25	15.00	5.00	0.00	1.00	145.00	1000.00	42.00
0	5.90	0.30	15.00	3.00	0.00	1.00	145.00	1000.00	42.00
1	0.75	0.35	15.00	5.00	0.00	1.00	145.00	1000.00	42.00
0	4.20	0.75	15.00	5.00	0.00	1.00	120.00	500.00	44.00
1	1.05	0.78	15.00	5.00	0.00	1.00	120.00	500.00	44.00
1	1.80	0.82	15.00	3.00	0.00	1.00	120.00	500.00	45.00
1	2.70	0.88	15.00	3.00	0.00	1.00	120.00	500.00	45.00
1	5.20	0.77	15.00	3.00	0.00	1.00	120.00	500.00	44.00
0	4.70	0.70	15.00	5.00	0.00	1.00	120.00	500.00	44.00
0	4.00	0.83	15.00	5.00	0.00	1.00	120.00	500.00	45.00
1	0.70	0.83	15.00	3.00	0.00	1.00	120.00	500.00	45.00
1	1.65	0.90	15.00	1.00	0.00	1.00	145.00	500.00	45.00
0	5.50	0.90	15.00	1.00	0.00	1.00	145.00	500.00	45.00
1	2.55	0.90	15.00	1.00	0.00	1.00	145.00	500.00	45.00
1	1.25	0.90	15.00	1.00	0.00	1.00	145.00	500.00	45.00
1	1.00	1.00	15.00	1.00	0.00	1.00	145.00	500.00	44.00
0	1.90	1.00	15.00	3.00	0.00	1.00	145.00	500.00	44.00
1	2.10	1.10	15.00	1.00	0.00	1.00	145.00	500.00	43.00
0	5.70	1.10	15.00	1.00	0.00	1.00	145.00	500.00	43.00
1	1.60	1.10	15.00	1.00	0.00	1.00	145.00	500.00	43.00
1	4.40	1.20	15.00	1.00	0.00	1.00	145.00	500.00	43.00
0	2.65	1.25	15.00	1.00	0.00	1.00	145.00	500.00	43.00
1	5.60	1.35	15.00	1.00	0.00	1.00	145.00	500.00	42.00
1	1.10	1.37	15.00	1.00	0.00	1.00	145.00	500.00	42.00
1	5.90	1.30	15.00	1.00	0.00	1.00	145.00	500.00	43.00
1	0.10	1.25	15.00	1.00	0.00	1.00	145.00	500.00	43.00
0	6.90	1.32	15.00	1.00	0.00	1.00	145.00	500.00	42.00
0	5.60	1.35	15.00	1.00	0.00	1.00	145.00	500.00	42.00
0	5.00	1.45	15.00	1.00	0.00	1.00	145.00	500.00	41.00
1	0.10	1.45	15.00	1.00	0.00	1.00	145.00	500.00	41.00

41413 27 SEPT 78

1	1.10	0.12	15.00	2.00	0.10	1.00	20.00	41.00
0	4.80	0.15	15.00	2.00	0.10	1.00	20.00	41.00
1	1.25	0.30	15.00	2.00	0.10	1.00	20.00	42.00
0	2.00	0.30	15.00	2.00	0.10	1.00	20.00	42.00
0	3.25	0.42	15.00	2.00	0.10	1.00	20.00	42.00
1	0.40	0.47	15.00	2.00	0.10	1.00	20.00	43.00
0	3.00	0.54	15.00	2.00	0.10	1.00	20.00	43.00
1	1.60	0.57	15.00	2.00	0.10	1.00	20.00	43.00
1	2.00	0.75	15.00	2.00	0.10	1.00	20.00	44.00
0	4.00	0.90	15.00	2.00	0.10	1.00	20.00	45.00
0	0.80	1.10	15.00	2.00	0.10	1.00	20.00	45.00
0	4.50	1.10	15.00	2.00	0.10	1.00	20.00	45.00

41441 27 SEPT 78

0	3.60	0.02	15.00	2.00	0.70	1.00	10.00	41.00
1	1.00	0.12	15.00	1.00	0.60	1.00	10.00	42.00
0	2.90	0.30	15.00	1.00	0.50	1.00	10.00	43.00
1	0.40	0.62	15.00	2.00	0.50	1.00	10.00	44.00
0	3.40	0.72	15.00	3.00	0.40	1.00	10.00	45.00
1	2.70	0.65	15.00	4.00	0.30	1.00	10.00	44.00
0	2.70	1.42	15.00	7.50	0.20	1.00	10.00	47.00
1	1.25	1.53	15.00	7.50	0.20	1.00	10.00	47.00
0	1.60	1.93	15.00	7.50	0.30	1.00	10.00	47.00
1	1.30	2.07	15.00	7.00	0.40	1.00	10.00	46.00
1	1.00	3.02	15.00	7.00	0.50	1.00	20.00	42.00
0	2.90	3.12	15.00	7.00	0.60	1.00	20.00	42.00
1	1.60	3.23	15.00	7.00	0.80	1.00	20.00	41.00
0	2.40	3.37	15.00	6.00	0.90	1.00	20.00	40.00
1	1.60	3.48	15.00	6.00	1.00	1.00	20.00	39.00
1	0.25	1.38	15.00	7.50	0.02	1.00	10.00	38.00
1	0.25	3.68	15.00	6.00	1.00	1.00	20.00	47.00
0	2.00	2.35	15.00	7.00	0.50	1.00	20.00	45.00
0	4.10	2.47	15.00	7.00	0.50	1.00	20.00	44.00

PT TURNER 27 SEPT 78

0	1.50	0.03	15.00	2.00	0.10	1.00	15.00	37.00
1	3.80	0.06	15.00	2.00	0.10	1.00	15.00	37.00
1	1.85	0.26	15.00	2.00	0.10	1.00	15.00	39.00
1	1.50	0.26	15.00	2.00	0.10	1.00	15.00	39.00
1	0.10	0.35	15.00	2.00	0.10	1.00	17.00	40.00
0	3.80	0.55	15.00	2.00	0.10	1.00	17.00	41.00
1	0.10	0.55	15.00	2.00	0.10	1.00	17.00	41.00
0	6.80	0.78	15.00	2.00	0.10	1.00	17.00	42.00
1	2.30	0.95	15.00	2.00	0.10	1.00	17.00	43.00
1	0.60	1.02	15.00	2.00	0.05	1.00	17.00	44.00
0	4.30	1.14	15.00	2.00	0.05	1.00	17.00	44.00
0	3.00	1.36	15.00	2.00	0.05	1.00	17.00	45.00
1	0.70	1.34	15.00	2.00	0.05	1.00	17.00	45.00
1	2.10	0.15	15.00	7.50	0.05	1.00	10.00	47.00
1	0.10	0.27	15.00	7.50	0.02	1.00	10.00	47.00
0	3.00	0.35	15.00	7.50	0.02	1.00	10.00	47.00
1	2.70	0.40	15.00	7.50	0.02	1.00	10.00	47.00
1	1.50	0.65	15.00	7.50	0.02	1.00	10.00	47.00
1	0.20	0.85	15.00	7.50	0.02	1.00	10.00	46.00
0	3.75	0.68	15.00	7.50	0.02	1.00	10.00	47.00
1	1.50	0.90	15.00	7.50	0.02	1.00	10.00	46.00
1	2.20	0.92	15.00	7.50	0.02	1.00	10.00	46.00
1	4.50	1.02	15.00	7.50	0.02	1.00	10.00	46.00
1	3.00	1.22	15.00	7.50	0.02	1.00	10.00	45.00
0	2.40	1.22	15.00	7.50	0.02	1.00	10.00	45.00
1	1.60	1.49	15.00	7.50	0.02	1.00	10.00	43.00
0	5.30	1.51	15.00	7.50	0.02	1.00	10.00	43.00
1	0.65	1.91	15.00	7.50	0.02	1.00	10.00	41.00
0	2.30	2.13	15.00	7.50	0.02	1.00	10.00	40.00

PT.	TURNER	SEPT 29 78						
1	0.00	2.62	15.00	3.00	0.05	1.00	10.00	46.00
1	1.80	2.65	15.00	3.00	0.05	1.00	10.00	45.00
1	4.60	2.83	15.00	3.00	0.05	1.00	10.00	45.00
0	3.80	3.51	15.00	3.00	0.05	1.00	10.00	42.00
0	3.00	3.63	15.00	3.00	0.05	1.00	10.00	41.00
1	0.80	3.85	15.00	3.00	0.05	1.00	10.00	39.00
1	2.20	4.03	15.00	3.00	0.05	1.00	10.00	38.00
0	3.10	4.05	15.00	3.00	0.05	1.00	10.00	38.00
1	3.00	4.28	15.00	3.00	0.05	1.00	10.00	37.00
0	3.30	4.55	15.00	3.00	0.05	1.00	10.00	35.00
1	1.20	4.67	15.00	3.00	0.05	1.00	10.00	33.00
0	1.80	4.60	15.00	3.00	0.05	1.00	10.00	34.00
0	4.10	0.13	15.00	3.00	0.00	1.00	15.00	39.00
0	3.50	0.81	15.00	3.00	0.00	1.00	15.00	42.00
0	4.00	0.66	15.00	3.00	0.00	1.00	15.00	42.00
1	0.40	0.83	15.00	3.00	0.00	1.00	15.00	42.00
0	1.30	1.13	15.00	3.00	0.00	1.00	15.00	44.00
0	1.20	1.80	15.00	3.00	0.00	1.00	15.00	46.00
0	4.90	1.80	15.00	3.00	0.00	1.00	15.00	46.00
1	1.00	1.90	15.00	3.00	0.00	1.00	15.00	46.00
0	2.30	2.05	15.00	3.00	0.00	1.00	15.00	46.00
0	6.20	0.63	15.00	3.00	0.00	1.00	15.00	42.00
0	6.00	1.70	15.00	3.00	0.00	1.00	15.00	45.00
0	3.90	3.15	15.00	3.00	0.00	1.00	10.00	43.00
0	5.50	4.45	15.00	3.00	0.00	1.00	10.00	35.00
0	6.00	1.05	15.00	3.00	0.00	1.00	15.00	43.00
0	6.00	1.55	15.00	3.00	0.00	1.00	10.00	46.00

41413	29	SEPT	78					
C	5. 90	0. 17	15. 00	3. 00	0. 00	1. 50	20. 00	41. 00
1	0. 20	0. 17	15. 00	2. 00	0. 00	1. 50	20. 00	41. 00
0	4. 85	0. 63	15. 00	2. 00	0. 00	1. 50	20. 00	43. 00
1	1. 20	0. 57	15. 00	2. 00	0. 00	1. 50	20. 00	43. 00
1	1. 65	0. 70	15. 00	2. 00	0. 00	1. 50	20. 00	43. 00
1	0. 10	0. 92	15. 00	1. 00	0. 00	1. 00	20. 00	45. 00
0	2. 50	0. 98	15. 00	1. 00	0. 00	1. 00	20. 00	45. 00
0	5. 90	0. 87	15. 00	1. 00	0. 00	1. 00	20. 00	44. 00
0	4. 10	1. 20	15. 00	2. 00	0. 05	1. 00	20. 00	45. 00
1	0. 90	2. 08	15. 00	3. 00	0. 10	1. 50	20. 00	43. 00
1	3. 60	2. 46	15. 00	3. 00	0. 07	1. 50	10. 00	45. 00
0	2. 30	2. 70	15. 00	3. 00	0. 06	1. 50	10. 00	45. 00
0	0. 60	2. 98	15. 00	3. 00	0. 05	1. 00	10. 00	43. 00
1	0. 20	3. 45	15. 00	4. 00	0. 05	1. 50	10. 00	41. 00
0	2. 25	3. 53	15. 00	4. 00	0. 05	1. 50	10. 00	40. 00
0	4. 70	3. 37	15. 00	6. 00	0. 05	1. 50	10. 00	41. 00
0	6. 20	4. 55	15. 00	6. 00	0. 05	1. 50	10. 00	32. 00
0	3. 40	4. 92	15. 00	7. 50	0. 05	1. 50	10. 00	29. 00
1	1. 00	5. 02	15. 00	7. 50	0. 05	1. 50	10. 00	27. 00
0	4. 20	2. 00	15. 00	3. 00	0. 10	1. 50	10. 00	47. 00
0	4. 00	3. 10	15. 00	4. 00	0. 05	1. 50	10. 00	42. 00

44349	29	SEPT	78					
0	3. 80	0. 13	15. 00	3. 00	0. 00	1. 50	10. 00	41. 00
0	3. 60	0. 47	15. 00	3. 00	0. 00	1. 50	10. 00	42. 00
1	0. 50	0. 80	15. 00	2. 00	0. 00	1. 00	10. 00	44. 00
1	0. 15	1. 12	15. 00	1. 00	0. 00	1. 00	10. 00	43. 00
1	0. 60	1. 75	15. 00	2. 00	0. 05	1. 50	10. 00	47. 00
1	1. 70	2. 18	15. 00	3. 00	0. 10	1. 50	10. 00	43. 00
1	0. 70	2. 30	15. 00	3. 00	0. 10	1. 50	10. 00	46. 00
0	5. 80	2. 63	15. 00	3. 00	0. 05	1. 00	10. 00	45. 00
0	6. 75	1. 45	15. 00	2. 00	0. 05	1. 50	10. 00	46. 00
0	1. 95	2. 87	15. 00	3. 00	0. 05	1. 00	10. 00	44. 00
0	5. 90	2. 93	15. 00	3. 00	0. 05	1. 00	10. 00	44. 00
1	1. 10	3. 47	15. 00	4. 00	0. 05	1. 50	10. 00	41. 00
0	3. 50	3. 52	15. 00	5. 00	0. 05	1. 50	10. 00	40. 00

PT WELLS OCT 2 78

1	0.50	2.10	11.00	3.50	0.70	3.00	12.00	32.00
0	4.40	2.20	11.00	3.50	0.70	3.00	12.00	30.00
1	1.10	2.53	10.50	3.70	0.65	3.00	12.00	28.00
0	1.75	3.02	10.00	4.00	0.60	1.50	12.00	23.00
0	2.50	3.10	10.00	4.00	0.60	1.50	12.00	22.00
1	2.10	3.20	10.00	4.00	0.60	1.50	12.00	21.00
1	0.40	3.12	10.00	4.00	0.60	1.50	12.00	22.00
1	2.60	0.00	10.00	7.00	0.10	1.50	12.00	45.00
1	1.10	0.02	10.00	7.00	0.10	1.50	12.00	45.00
1	0.30	0.22	10.00	7.00	0.15	1.50	12.00	44.00
1	0.40	0.48	10.00	6.00	0.20	1.50	12.00	43.00
0	3.50	0.83	10.00	6.00	0.25	1.50	12.00	41.00
1	1.30	0.90	10.00	6.00	0.30	1.50	12.00	40.00
1	1.50	1.03	10.00	5.00	0.35	1.50	12.00	39.00
0	5.20	1.25	10.00	5.00	0.40	1.50	12.00	38.00
0	5.40	0.14	10.00	7.00	0.15	1.50	12.00	44.00

41365 OCT 2 78

1	1.70	0.00	12.00	11.50	0.10	2.00	20.00	38.00
1	0.05	0.28	12.00	11.50	0.10	2.00	20.00	39.00
0	4.00	0.27	12.00	11.50	0.10	2.00	20.00	39.00
0	1.60	0.65	12.00	11.00	0.10	2.00	20.00	41.00
1	0.40	0.82	12.00	10.00	0.10	2.00	20.00	42.00
0	3.50	0.70	12.00	10.00	0.10	2.00	20.00	42.00
0	2.10	1.02	12.00	10.00	0.10	2.00	20.00	43.00
1	0.30	1.45	12.00	9.00	0.10	2.00	10.00	44.00
1	0.10	1.90	12.00	9.00	0.10	2.00	10.00	45.00
0	4.00	1.88	12.00	8.00	0.10	2.00	10.00	45.00
1	0.55	2.58	10.00	7.00	0.10	2.00	10.00	44.00
1	1.70	2.90	10.00	7.00	0.15	2.00	10.00	43.00
0	3.30	3.03	10.00	6.00	0.20	2.00	10.00	43.00
0	3.30	2.63	10.00	7.00	0.10	2.00	10.00	44.00
0	2.10	0.39	12.00	11.50	0.10	2.00	20.00	40.00

PT TURNER 2 OCT 78

0	2.00	0.08	12.00	11.50	0.10	2.00	10.00	38.00
1	1.20	0.22	12.00	11.50	0.10	2.00	10.00	39.00
1	0.75	0.60	12.00	11.50	0.10	2.00	10.00	41.00
1	0.90	0.72	12.00	11.50	0.10	2.00	10.00	42.00
0	4.60	0.72	12.00	11.50	0.10	2.00	10.00	42.00
1	2.40	1.02	12.00	10.00	0.10	2.00	10.00	43.00
0	2.75	1.18	12.00	10.00	0.10	2.00	10.00	43.00
0	1.50	1.28	12.00	10.00	0.10	2.00	10.00	44.00
1	1.50	1.50	12.00	10.00	0.10	2.00	10.00	45.00
1	0.00	1.62	12.00	9.00	0.10	2.00	10.00	45.00
0	4.10	1.70	12.00	9.00	0.10	2.00	10.00	45.00
0	5.00	2.08	11.00	9.00	0.10	2.00	10.00	46.00
1	1.90	2.03	11.00	8.00	0.10	2.00	10.00	45.00
0	3.90	2.58	11.00	7.00	0.10	1.50	15.00	46.00
1	0.90	2.58	11.00	7.00	0.10	1.50	15.00	45.00
1	0.90	2.76	11.00	7.00	0.10	1.50	15.00	45.00
0	4.60	2.88	11.00	7.00	0.10	1.50	15.00	45.00
1	1.10	3.38	11.00	6.00	0.10	1.50	15.00	42.00
1	0.20	3.63	11.00	6.00	0.10	1.50	15.00	41.00
0	2.50	4.03	11.00	5.00	0.40	1.50	15.00	38.00
0	2.75	4.28	11.00	5.00	0.40	1.50	15.00	37.00
1	2.80	3.28	11.00	5.00	0.40	1.50	15.00	42.00
0	4.25	3.58	11.00	5.00	0.40	1.50	15.00	41.00

44348 OCT 2 78

1	1.40	0.40	10.00	7.00	0.10	1.50	10.00	44.00
1	1.50	0.72	10.00	6.00	0.10	1.50	10.00	43.00
0	3.60	0.73	10.00	6.00	0.10	1.50	10.00	43.00
1	0.50	1.05	10.00	6.00	0.20	1.50	10.00	41.00
1	0.75	1.45	10.00	5.00	0.40	1.50	10.00	38.00
0	3.50	1.50	10.00	5.00	0.40	1.50	10.00	37.00
0	3.25	2.33	11.00	3.50	0.70	2.00	10.00	31.00
1	1.60	3.27	10.00	4.00	0.60	1.50	10.00	22.00
0	2.20	3.37	10.00	4.00	0.60	1.50	10.00	21.00
0	1.25	0.20	10.00	7.00	0.10	1.50	10.00	44.00

HH52A 3 OCT 78

0	5.30	0.12	15.00	12.00	0.50	2.00	90.00	500.00	41.00
1	0.00	0.35	15.00	12.00	0.50	2.00	90.00	500.00	42.00
1	2.10	0.37	15.00	12.00	0.50	2.00	90.00	500.00	42.00
1	1.80	0.60	15.00	12.00	0.50	2.00	90.00	500.00	43.00
0	5.10	0.67	15.00	12.00	0.50	2.00	90.00	500.00	43.00
1	2.20	0.84	15.00	12.00	0.50	2.00	90.00	500.00	44.00
0	3.60	0.94	15.00	12.00	0.50	2.00	90.00	500.00	44.00
0	5.50	1.06	15.00	12.00	0.50	2.00	90.00	500.00	43.00
1	2.10	1.14	15.00	12.00	0.50	2.00	90.00	500.00	45.00
0	3.25	1.30	11.00	9.00	0.50	2.00	90.00	500.00	44.00
1	2.80	1.30	11.00	9.00	0.50	2.00	90.00	500.00	44.00
0	2.90	1.50	11.00	9.00	0.60	2.00	80.00	500.00	44.00
0	1.80	1.60	11.00	9.00	0.60	2.00	90.00	500.00	45.00
0	1.50	1.70	11.00	11.00	0.70	2.00	80.00	500.00	45.00
1	1.85	1.80	11.00	11.00	0.70	2.00	90.00	500.00	12.00
0	3.00	2.10	11.00	13.00	0.80	2.00	85.00	500.00	49.00
0	1.20	2.20	11.00	13.00	0.80	2.00	85.00	500.00	54.00
0	3.10	2.30	11.00	13.00	0.80	2.00	85.00	500.00	50.00
1	1.50	2.30	11.00	13.00	0.80	2.00	85.00	500.00	56.00
0	2.75	2.50	11.00	13.00	0.80	2.00	85.00	500.00	57.00

41413 4 OCT 78

1	0.10	0.23	10.00	17.00	0.90	3.00	10.00	39.00
0	1.10	0.37	10.00	17.00	0.90	3.00	10.00	40.00
1	0.00	0.55	10.00	17.00	0.90	3.00	10.00	41.00
1	0.05	0.60	10.00	17.00	0.90	3.00	10.00	41.00
0	2.40	0.65	10.00	17.00	0.90	3.00	10.00	41.00
0	1.50	0.72	10.00	17.00	0.90	3.00	10.00	42.00
0	1.20	0.94	10.00	17.00	0.90	3.00	10.00	43.00
0	1.10	1.09	10.00	20.00	0.90	4.00	10.00	43.00
0	0.90	1.32	10.00	20.00	0.95	4.00	10.00	44.00

44352 4 OCT 78

0	0.30	0.02	11.00	18.00	0.90	4.00	10.00	44.00
0	0.40	0.09	11.00	18.00	0.90	4.00	10.00	44.00
0	0.90	0.19	11.00	18.00	0.90	4.00	10.00	44.00
0	0.60	0.56	12.00	20.00	0.95	4.00	10.00	45.00
0	0.70	0.94	12.00	20.00	0.95	4.00	10.00	45.00
0	3.00	1.10	12.00	20.00	0.95	4.00	10.00	44.00

FT TURNER 4 OCT 78

0	1.45	0.20	10.00	17.00	0.90	3.00	15.00	38.00
0	1.60	0.38	10.00	17.00	0.90	3.00	15.00	40.00
1	0.70	0.40	10.00	17.00	0.90	3.00	15.00	40.00
1	0.20	0.52	10.00	17.00	0.90	3.00	15.00	40.00
0	2.10	0.62	10.00	17.00	0.90	3.00	15.00	41.00
0	2.05	0.65	10.00	17.00	0.90	3.00	15.00	41.00
1	0.10	0.92	10.00	17.00	0.90	3.00	15.00	42.00
1	0.10	0.97	10.00	17.00	0.90	3.00	15.00	42.00
0	1.75	1.02	11.00	18.00	0.90	3.00	15.00	43.00
0	2.20	1.02	11.00	19.00	0.90	3.00	15.00	43.00
0	1.40	2.17	12.00	25.00	0.95	4.00	10.00	45.00
0	0.60	2.33	12.00	25.00	0.95	5.00	10.00	45.00
0	0.30	2.38	12.00	25.00	0.90	5.00	10.00	45.00

HH52 5 OCT 78

0	4.55	0.10	5.00	5.00	0.40	1.00	60.00	400.00	40.00
1	2.48	0.27	5.00	5.00	0.60	1.00	60.00	400.00	41.00
1	0.20	0.50	5.00	5.00	0.60	1.00	60.00	400.00	42.00
1	2.30	0.63	5.00	5.00	0.60	1.00	60.00	400.00	43.00
0	4.90	2.50	8.00	7.00	0.70	1.00	65.00	400.00	55.00
1	1.10	2.70	8.00	7.00	0.70	1.00	65.00	400.00	51.00
1	0.60	2.80	8.00	7.00	0.70	1.00	65.00	400.00	50.00
1	1.65	3.00	8.00	7.00	0.70	1.00	65.00	400.00	29.00
0	5.40	2.90	8.00	7.00	0.70	1.00	65.00	400.00	29.00
0	5.75	1.13	5.00	5.00	0.60	1.00	65.00	400.00	44.00
0	3.00	1.22	5.00	5.00	0.60	1.00	65.00	400.00	44.00
1	0.60	1.42	5.00	5.00	0.60	1.00	65.00	400.00	43.00
1	2.20	1.48	5.00	5.00	0.60	1.00	65.00	400.00	43.00
0	0.60	1.80	6.00	5.00	0.80	1.00	65.00	400.00	45.00
0	5.20	1.95	6.00	5.00	0.80	1.00	65.00	400.00	44.00
0	2.90	1.85	6.00	5.00	0.80	1.00	65.00	400.00	44.00

HC130 5 OCT 78

1	0.40	0.10	5.00	5.00	0.80	1.00	200.00	800.00	45.00
0	1.70	0.20	5.00	5.00	0.80	1.00	200.00	800.00	45.00
0	2.00	0.20	5.00	5.00	0.80	1.00	200.00	800.00	45.00
0	0.15	0.25	5.00	5.00	0.80	1.00	200.00	800.00	45.00
0	1.60	0.32	5.00	5.00	0.80	1.00	200.00	800.00	45.00
0	2.35	0.68	5.00	5.00	0.80	1.00	150.00	800.00	44.00
0	1.60	0.56	5.00	5.00	0.80	1.00	150.00	800.00	45.00
0	0.55	0.66	5.00	5.00	0.80	1.00	150.00	800.00	45.00
0	0.70	0.60	5.00	5.00	0.80	1.00	150.00	800.00	45.00
1	1.10	0.62	5.00	5.00	0.80	1.00	150.00	800.00	45.00
0	2.15	0.58	5.00	5.00	0.80	1.00	150.00	800.00	45.00
0	0.75	1.50	8.00	7.00	0.70	1.50	150.00	1000.00	24.00
1	0.10	1.60	8.00	7.00	0.70	1.50	150.00	1000.00	22.00
0	0.50	1.70	8.00	7.00	0.70	1.50	150.00	1000.00	22.00
0	0.80	1.80	8.00	7.00	0.70	1.50	150.00	1000.00	21.00
1	1.80	1.10	8.00	7.00	0.70	1.50	200.00	1000.00	28.00
0	0.70	1.10	8.00	7.00	0.70	1.50	200.00	1000.00	28.00
0	0.00	1.10	8.00	7.00	0.70	1.50	200.00	1000.00	27.00
1	0.30	1.10	8.00	7.00	0.70	1.50	200.00	1000.00	27.00

HC130 20 JAN 79

0	0.50	0.30	10.00	20.00	0.50	3.00	200.00	1000.00	22.50	2.00
0	0.40	0.30	10.00	20.00	0.50	3.00	200.00	1000.00	22.50	0.00
0	0.60	0.30	10.00	20.00	0.50	3.00	200.00	1000.00	22.50	1.00
0	1.50	0.30	10.00	20.00	0.50	3.00	200.00	1000.00	22.50	2.00
0	1.60	0.30	10.00	20.00	0.50	3.00	200.00	1000.00	22.50	0.00
0	1.40	0.30	10.00	20.00	0.50	3.00	200.00	1000.00	22.50	1.00

HC130 31 JAN 79

0	2.00	0.20	10.00	30.00	0.60	3.00	160.00	500.00	45.00	2.00
0	0.20	0.30	10.00	30.00	0.60	3.00	160.00	500.00	45.00	2.00
0	0.80	0.30	10.00	30.00	0.60	3.00	160.00	500.00	45.00	0.00
1	1.00	0.30	10.00	30.00	0.60	3.00	160.00	500.00	45.00	1.00
0	1.20	0.40	10.00	30.00	0.60	3.00	160.00	500.00	45.00	0.00
0	0.80	0.40	10.00	30.00	0.60	3.00	160.00	500.00	45.00	1.00

PT WELLS 16 APRIL 79

0	3.80	0.05	14.00	2.00	1.00	1.00	15.00	58.00	0.00
1	0.80	0.10	14.00	2.00	1.00	1.00	15.00	58.00	2.00
0	2.80	0.20	14.00	2.00	1.00	1.00	15.00	57.00	1.00
1	0.90	0.40	14.00	2.00	1.00	1.00	15.00	57.00	1.00
0	2.90	0.50	14.00	2.00	1.00	1.00	15.00	56.00	2.00
0	1.80	0.60	14.00	2.00	1.00	1.00	15.00	55.00	0.00
0	3.40	0.70	14.00	2.00	1.00	1.00	15.00	55.00	2.00
0	2.80	0.70	14.00	2.00	1.00	1.00	15.00	55.00	1.00
1	0.80	0.70	14.00	2.00	1.00	1.00	15.00	55.00	0.00
1	2.20	0.90	14.00	2.00	1.00	1.00	15.00	54.00	0.00
1	1.10	0.90	14.00	2.00	1.00	1.00	15.00	54.00	1.00
1	0.40	1.20	15.00	1.50	1.00	0.50	15.00	52.00	0.00
0	3.00	1.20	15.00	1.50	1.00	0.50	15.00	51.00	1.00
0	2.10	1.40	15.00	1.50	1.00	0.50	15.00	50.00	0.00
1	1.90	1.50	15.00	1.50	1.00	0.50	15.00	50.00	0.00
0	4.20	1.60	15.00	1.50	1.00	0.50	15.00	48.00	0.00
1	1.70	1.60	15.00	1.50	1.00	0.50	15.00	48.00	0.00
1	2.10	1.90	15.00	1.00	1.00	0.50	15.00	44.00	0.00
1	0.90	2.10	15.00	1.00	1.00	0.50	15.00	42.00	1.00
0	2.90	2.10	15.00	1.00	1.00	0.50	15.00	42.00	0.00
1	0.30	2.20	15.00	1.00	1.00	0.50	15.00	41.00	0.00
1	1.60	2.40	15.00	1.00	1.00	0.50	15.00	40.00	2.00
1	2.80	2.50	15.00	1.00	1.00	0.50	15.00	39.00	1.00
1	2.50	2.60	15.00	1.00	1.00	0.50	15.00	38.00	0.00
1	1.10	2.60	15.00	1.00	1.00	0.50	15.00	38.00	1.00
1	1.00	2.80	15.00	1.00	1.00	0.50	15.00	36.00	0.00
1	0.10	2.80	15.00	1.00	1.00	0.50	15.00	36.00	0.00
1	1.70	3.30	15.00	1.00	1.00	0.50	15.00	30.00	0.00
1	0.80	3.40	15.00	1.00	1.00	0.50	15.00	29.00	0.00
0	2.90	3.60	15.00	1.00	1.00	0.50	15.00	27.00	1.00
0	4.20	3.70	15.00	1.00	1.00	0.50	15.00	26.00	0.00

41365 16 APRIL 79

1	0.50	0.60	14.00	2.00	1.00	1.00	15.00	58.00	0.00
0	2.80	0.60	14.00	2.00	1.00	1.00	15.00	59.00	0.00
1	1.10	0.80	14.00	2.00	1.00	1.00	15.00	59.00	0.00
0	2.00	1.10	14.00	2.00	1.00	1.00	15.00	59.00	0.00
1	0.80	1.30	14.00	2.00	1.00	1.00	15.00	59.00	0.00
1	0.50	1.40	14.00	2.00	1.00	1.00	15.00	59.00	2.00
0	2.50	1.60	14.00	2.00	1.00	1.00	15.00	59.00	0.00
0	2.50	1.70	14.00	2.00	1.00	1.00	15.00	58.00	2.00
0	3.90	1.70	15.00	1.50	1.00	0.50	24.00	54.00	1.00
0	1.80	2.00	15.00	1.50	1.00	0.50	24.00	54.00	0.00
0	2.90	2.10	15.00	1.50	1.00	0.50	24.00	53.00	0.00
1	1.40	2.30	15.00	1.50	1.00	0.50	24.00	52.00	0.00
1	0.40	2.40	15.00	1.50	1.00	0.50	24.00	51.00	0.00
1	0.50	2.60	15.00	1.50	1.00	0.50	24.00	48.00	0.00
0	1.90	2.70	15.00	1.50	1.00	0.50	24.00	48.00	2.00
1	0.80	2.70	15.00	1.50	1.00	0.50	24.00	48.00	1.00
0	1.40	2.80	15.00	1.50	1.00	0.50	24.00	48.00	0.00
1	0.10	2.80	15.00	1.50	1.00	0.50	24.00	48.00	0.00

44348 16 APRIL 79

1	1.00	0.10	15.00	1.50	1.00	0.50	10.20	54.00	2.00
1	1.40	0.20	15.00	1.50	1.00	0.50	10.20	53.00	2.00
1	1.90	0.20	15.00	1.50	1.00	0.50	10.20	53.00	1.00
1	0.10	0.40	15.00	1.50	1.00	0.50	10.20	51.00	0.00
1	0.80	0.70	15.00	1.50	1.00	0.50	10.20	48.00	0.00
0	1.70	1.60	15.00	1.50	1.00	0.50	10.20	40.00	0.00
1	0.40	1.70	15.00	1.50	1.00	0.50	10.20	39.00	1.00
1	0.00	2.10	15.00	1.50	1.00	0.50	10.20	37.00	2.00
1	1.70	2.10	15.00	1.50	1.00	0.50	10.20	37.00	0.00
1	1.80	2.80	15.00	1.50	1.00	0.50	10.20	29.00	1.00

PT. TURNER 16 APRIL 79

0	2.10	0.10	14.00	2.00	1.00	1.00	17.00	56.00	0.00
1	1.00	0.20	14.00	2.00	1.00	1.00	17.00	56.00	1.00
0	3.10	0.20	14.00	2.00	1.00	1.00	17.00	56.00	0.00
1	0.30	0.20	14.00	2.00	1.00	1.00	17.00	56.00	0.00
1	1.20	0.40	14.00	2.00	1.00	1.00	17.00	54.00	2.00
0	2.60	0.50	14.00	2.00	1.00	1.00	17.00	54.00	1.00
1	1.40	0.60	14.00	2.00	1.00	1.00	17.00	54.00	2.00
1	2.30	0.60	14.00	2.00	1.00	1.00	17.00	54.00	0.00
1	0.10	0.80	15.00	1.50	1.00	0.50	17.00	53.00	0.00
1	1.20	0.80	15.00	1.50	1.00	0.50	17.00	53.00	0.00
0	4.40	1.20	15.00	1.50	1.00	0.50	17.00	50.00	0.00
1	1.80	1.30	15.00	1.50	1.00	0.50	17.00	49.00	0.00
1	0.80	1.40	15.00	1.50	1.00	0.50	17.00	46.00	0.00
1	0.40	1.50	15.00	1.50	1.00	0.50	17.00	46.00	2.00
0	2.80	1.50	15.00	1.50	1.00	0.50	17.00	46.00	1.00
1	2.50	1.60	15.00	1.50	1.00	0.50	17.00	46.00	2.00
1	0.70	1.80	15.00	1.00	1.00	0.50	17.00	43.00	2.00
1	0.90	1.90	15.00	1.00	1.00	0.50	17.00	42.00	0.00
0	3.90	1.80	15.00	1.00	1.00	0.50	17.00	42.00	0.00
0	2.90	1.90	15.00	1.00	1.00	0.50	17.00	41.00	1.00
1	0.90	2.00	15.00	1.00	1.00	0.50	17.00	41.00	1.00
0	2.80	2.20	15.00	1.00	1.00	0.50	17.00	40.00	2.00
1	1.60	2.20	15.00	1.00	1.00	0.50	17.00	40.00	0.00
0	4.00	2.30	15.00	1.00	1.00	0.50	17.00	38.00	0.00
0	3.30	2.40	15.00	1.00	1.00	0.50	17.00	37.00	2.00
1	3.20	2.40	15.00	1.00	1.00	0.50	17.00	37.00	1.00
1	1.00	2.40	15.00	1.00	1.00	0.50	17.00	37.00	0.00
1	1.80	2.40	15.00	1.00	1.00	0.50	17.00	37.00	0.00
1	1.30	2.60	15.00	1.00	1.00	0.50	17.00	35.00	1.00
1	3.40	2.90	15.00	1.00	1.00	0.50	17.00	32.00	1.00
1	0.00	2.90	15.00	1.00	1.00	0.50	17.00	31.00	0.00
0	2.50	3.00	15.00	1.00	1.00	0.50	17.00	30.00	0.00
1	2.00	3.10	15.00	1.00	1.00	0.50	17.00	29.00	0.00
0	4.20	3.20	15.00	1.00	1.00	0.50	17.00	28.00	0.00
0	5.00	3.40	15.00	1.00	1.00	0.50	17.00	26.00	1.00
1	2.10	2.60	15.00	1.00	1.00	0.50	17.00	35.00	0.00
1	1.70	3.20	15.00	1.00	1.00	0.50	17.00	28.00	0.00

HH3F 17 APRIL 79

0	2.70	0.10	10.00	10.00	0.50	1.00	90.00	500.00	55.00	-1.00
1	0.20	0.10	10.00	10.00	0.50	1.00	90.00	500.00	56.00	1.00
0	3.10	0.20	10.00	10.00	0.30	1.00	90.00	500.00	57.00	-1.00
0	4.00	0.20	10.00	10.00	0.30	1.00	90.00	500.00	57.00	1.00
1	1.40	0.30	10.00	10.00	0.30	1.00	90.00	500.00	57.00	-1.00
0	1.20	0.50	10.00	10.00	0.30	1.00	90.00	500.00	56.00	-1.00
1	0.00	0.50	10.00	10.00	0.30	1.00	90.00	500.00	56.00	-1.00
1	0.20	0.60	11.00	10.00	0.30	1.00	120.00	500.00	59.00	-1.00
0	2.90	0.60	11.00	10.00	0.40	1.00	120.00	500.00	59.00	1.00
1	0.50	0.70	11.00	10.00	0.40	1.00	120.00	500.00	59.00	1.00
0	4.00	0.70	11.00	11.00	0.40	1.00	120.00	500.00	59.00	-1.00
0	0.60	0.80	11.00	11.00	0.50	1.00	120.00	500.00	60.00	-1.00
0	2.90	0.80	11.00	11.00	0.60	1.00	120.00	500.00	60.00	-1.00
1	1.10	0.90	12.00	11.00	0.60	1.00	120.00	500.00	60.00	-1.00
0	0.60	1.40	15.00	4.00	0.90	1.00	90.00	500.00	48.00	-1.00
0	0.70	1.60	15.00	4.00	0.90	1.00	90.00	500.00	46.00	-1.00
1	0.80	1.70	15.00	4.00	0.90	1.00	90.00	500.00	45.00	-1.00
0	1.00	1.80	15.00	4.00	0.90	1.00	90.00	500.00	45.00	-1.00
0	1.10	1.90	15.00	4.00	0.90	1.00	90.00	500.00	44.00	-1.00
0	0.70	1.00	15.00	6.00	0.90	1.50	120.00	1000.00	54.00	-1.00
0	4.30	1.20	15.00	5.00	0.90	1.50	120.00	1000.00	53.00	-1.00
1	1.10	1.20	15.00	5.00	0.90	1.50	120.00	1000.00	52.00	-1.00
0	0.30	1.40	15.00	4.00	0.90	1.00	120.00	1000.00	51.00	-1.00

HH52 17 APRIL 79

0	2.60	0.00	13.00	11.00	0.60	1.00	90.00	500.00	59.00	-1.00
1	2.40	0.10	13.00	11.00	0.60	1.00	90.00	500.00	59.00	1.00
0	2.70	0.30	13.00	11.00	0.60	1.00	90.00	500.00	59.00	-1.00
1	2.50	0.30	13.00	11.00	0.60	1.00	90.00	500.00	59.00	-1.00
1	2.50	0.50	13.00	11.00	0.60	1.00	90.00	500.00	58.00	-1.00
0	2.60	0.70	13.00	11.00	0.60	1.00	90.00	500.00	57.00	-1.00
1	4.70	0.60	13.00	11.00	0.60	1.00	90.00	500.00	57.00	-1.00
1	1.30	0.80	15.00	8.00	1.00	2.00	90.00	500.00	56.00	-1.00
0	6.50	0.90	15.00	8.00	1.00	2.00	90.00	500.00	55.00	1.00
1	0.70	1.00	15.00	8.00	1.00	2.00	90.00	500.00	54.00	1.00
0	6.30	1.10	15.00	8.00	1.00	2.00	90.00	500.00	54.00	-1.00
0	0.40	1.10	15.00	8.00	1.00	2.00	90.00	500.00	54.00	-1.00
0	2.30	1.20	15.00	8.00	1.00	2.00	90.00	500.00	53.00	-1.00
0	7.00	1.30	15.00	8.00	1.00	2.00	90.00	500.00	52.00	-1.00
0	2.30	1.40	15.00	8.00	1.00	2.00	90.00	500.00	52.00	-1.00

HC130B 17 APRIL 79

0	2.10	0.00	10.00	10.00	0.30	1.00	150.00	1000.00	57.00	-1.00
1	0.40	0.10	10.00	10.00	0.30	1.00	150.00	1000.00	58.00	1.00
0	2.40	0.20	10.00	10.00	0.30	1.00	150.00	1000.00	58.00	1.00
1	0.00	0.20	10.00	10.00	0.30	1.00	150.00	1000.00	58.00	-1.00
1	1.90	0.30	10.00	10.00	0.30	1.00	150.00	1000.00	59.00	-1.00
0	2.80	0.40	10.00	10.00	0.30	1.00	150.00	1000.00	59.00	-1.00
0	0.90	0.40	10.00	10.00	0.30	1.00	150.00	1000.00	59.00	-1.00
1	1.00	0.50	10.00	10.00	0.30	1.00	150.00	1000.00	59.00	-1.00
1	1.20	0.60	11.00	10.00	0.40	1.00	150.00	1000.00	59.00	-1.00
0	1.40	0.60	11.00	10.00	0.40	1.00	180.00	1000.00	60.00	-1.00
1	0.40	0.70	11.00	10.00	0.40	1.00	180.00	1000.00	60.00	-1.00
0	2.40	0.80	11.00	10.00	0.40	1.00	180.00	1000.00	60.00	-1.00
1	0.40	0.80	12.00	10.00	0.50	1.00	180.00	1000.00	60.00	-1.00
0	2.40	0.90	12.00	11.00	0.50	1.00	180.00	1000.00	60.00	-1.00
0	2.20	0.90	12.00	11.00	0.50	1.00	180.00	1000.00	60.00	-1.00
1	0.40	1.00	12.00	11.00	0.50	1.00	180.00	1000.00	60.00	-1.00
0	2.80	1.00	13.00	11.00	0.60	1.00	180.00	1000.00	60.00	1.00
1	0.90	1.10	13.00	11.00	0.60	1.00	180.00	1000.00	60.00	1.00
0	1.50	1.10	13.00	11.00	0.60	1.00	180.00	1000.00	60.00	-1.00
0	0.20	1.30	15.00	4.00	0.90	1.00	150.00	1000.00	43.00	-1.00
1	0.30	1.50	15.00	4.00	0.90	1.00	180.00	1000.00	42.00	-1.00
1	0.30	1.60	15.00	4.00	0.90	1.00	180.00	1000.00	41.00	-1.00
0	0.40	1.70	15.00	4.00	0.90	1.00	180.00	1000.00	40.00	-1.00
0	0.40	0.40	10.00	10.00	0.30	1.00	150.00	1000.00	59.00	-1.00

HU16E 18 APRIL 79

1	1.20	0.10	15.00	9.00	0.10	1.00	150.00	1000.00	55.00	-1.00
0	3.50	0.10	15.00	9.00	0.10	1.00	150.00	1000.00	55.00	-1.00
1	3.60	0.20	15.00	9.00	0.10	1.00	150.00	1000.00	55.00	-1.00
1	2.60	0.20	15.00	9.00	0.10	1.00	150.00	1000.00	56.00	-1.00
0	3.80	0.20	15.00	9.00	0.10	1.00	150.00	1000.00	56.00	-1.00
0	2.60	0.30	15.00	9.00	0.10	1.00	150.00	1000.00	56.00	1.00
1	0.20	0.30	15.00	9.00	0.10	1.00	150.00	1000.00	57.00	1.00
1	1.80	0.40	15.00	9.00	0.10	1.00	150.00	1000.00	57.00	-1.00
1	2.60	0.40	15.00	9.00	0.10	1.00	150.00	1000.00	57.00	-1.00
0	4.00	0.50	15.00	9.00	0.15	1.00	120.00	1000.00	58.00	-1.00
1	0.50	0.50	15.00	9.00	0.15	1.00	120.00	1000.00	58.00	-1.00
1	0.40	0.50	15.00	9.00	0.15	1.00	120.00	1000.00	59.00	1.00
0	2.60	0.60	15.00	9.00	0.15	1.00	120.00	1000.00	59.00	1.00
1	2.10	0.70	15.00	9.00	0.15	1.00	120.00	1000.00	59.00	-1.00
1	0.20	0.80	15.00	9.00	0.15	1.00	120.00	1000.00	59.00	-1.00
1	0.40	0.90	15.00	9.00	0.15	1.00	120.00	1000.00	59.00	-1.00
1	0.10	1.00	15.00	10.00	0.50	1.00	150.00	1000.00	53.00	-1.00
0	1.50	1.00	15.00	10.00	0.50	1.00	150.00	1000.00	51.00	-1.00
0	3.00	1.10	15.00	10.00	0.60	1.00	150.00	1000.00	50.00	-1.00
0	2.10	1.20	15.00	10.00	0.60	1.00	150.00	1000.00	50.00	-1.00
0	3.10	1.20	15.00	10.00	0.60	1.00	150.00	1000.00	49.00	1.00
1	0.90	1.30	15.00	9.50	0.60	1.00	150.00	1000.00	49.00	1.00
0	3.20	1.30	15.00	9.50	0.60	1.00	150.00	1000.00	48.00	-1.00
1	2.70	1.40	15.00	9.50	0.70	1.00	150.00	1000.00	48.00	-1.00
0	0.90	1.40	15.00	9.00	0.80	1.00	120.00	1000.00	47.00	-1.00
0	3.90	1.50	15.00	9.00	0.80	1.00	120.00	1000.00	46.00	-1.00
0	0.90	1.50	15.00	9.00	0.80	1.00	120.00	1000.00	46.00	1.00
0	3.10	1.60	15.00	9.00	0.80	1.00	120.00	1000.00	45.00	1.00
0	2.10	1.60	15.00	9.00	0.80	1.00	120.00	1000.00	45.00	-1.00
0	3.00	1.70	15.00	9.00	0.80	1.00	120.00	1000.00	44.00	-1.00
1	2.50	1.80	15.00	9.00	0.80	1.00	120.00	1000.00	43.00	-1.00
0	0.20	1.90	15.00	9.00	0.80	1.00	120.00	1000.00	43.00	-1.00

HC-130B 18 APRIL 79

1	1.00	0.10	15.00	9.00	0.10	1.00	180.00	1000.00	60.00	-1.00
0	2.20	0.10	15.00	9.00	0.10	1.00	180.00	1000.00	60.00	-1.00
1	0.70	0.10	15.00	9.00	0.15	1.00	180.00	1000.00	60.00	-1.00
0	2.80	0.10	15.00	9.00	0.15	1.00	180.00	1000.00	60.00	-1.00
1	0.30	0.20	15.00	9.00	0.15	1.00	180.00	1000.00	60.00	1.00
1	0.20	0.30	15.00	9.50	0.20	1.00	180.00	1000.00	60.00	-1.00
0	3.00	0.30	15.00	9.50	0.20	1.00	180.00	1000.00	60.00	-1.00
0	3.00	0.40	15.00	9.50	0.25	1.00	150.00	1000.00	59.00	1.00
1	0.00	0.40	15.00	9.50	0.25	1.00	150.00	1000.00	59.00	1.00
0	2.20	0.50	15.00	9.50	0.25	1.00	150.00	1000.00	59.00	-1.00
1	1.00	0.50	15.00	9.50	0.25	1.00	150.00	1000.00	59.00	-1.00
0	1.30	0.60	15.00	9.50	0.30	1.00	150.00	1000.00	58.00	-1.00
1	1.10	0.70	15.00	7.50	0.60	1.00	180.00	1000.00	40.00	-1.00
1	0.70	0.80	15.00	7.50	0.60	1.00	180.00	1000.00	40.00	1.00
0	2.20	0.80	15.00	7.50	0.60	1.00	180.00	1000.00	39.00	1.00
1	0.10	0.90	15.00	7.50	0.60	1.00	180.00	1000.00	39.00	-1.00
1	0.00	1.00	15.00	7.50	0.60	1.00	150.00	1000.00	38.00	-1.00
0	2.20	1.10	15.00	7.50	0.60	1.00	150.00	1000.00	38.00	1.00
0	1.80	1.10	15.00	7.50	0.60	1.00	150.00	1000.00	37.00	1.00
1	0.80	1.10	15.00	7.50	0.60	1.00	150.00	1000.00	37.00	1.00
0	1.90	1.20	15.00	7.50	0.60	1.00	150.00	1000.00	37.00	-1.00
0	2.90	1.20	15.00	7.50	0.60	1.00	150.00	1000.00	36.00	-1.00
0	0.90	1.30	15.00	7.50	0.60	1.00	150.00	1000.00	36.00	-1.00
1	1.10	1.30	15.00	7.50	0.60	1.00	150.00	1000.00	35.00	-1.00
0	3.70	1.40	15.00	7.50	0.60	1.00	150.00	1000.00	35.00	1.00
1	0.80	0.40	15.00	9.50	0.20	1.00	150.00	1000.00	59.00	-1.00

HHS2 18 APRIL 79

1	0.90	0.10	15.00	9.00	0.10	1.00	90.00	500.00	57.00	-1.00
0	1.10	0.10	15.00	9.00	0.10	1.00	90.00	500.00	58.00	-1.00
0	2.90	0.20	15.00	9.00	0.10	1.00	90.00	500.00	58.00	-1.00
0	3.40	0.20	15.00	9.00	0.10	1.00	90.00	500.00	58.00	-1.00
1	1.20	0.20	15.00	9.00	0.10	1.00	90.00	500.00	59.00	1.00
1	0.60	0.30	15.00	9.00	0.10	1.00	90.00	500.00	60.00	-1.00
1	2.90	0.30	15.00	9.00	0.10	1.00	90.00	500.00	60.00	-1.00
0	1.90	0.40	15.00	9.00	0.10	1.00	90.00	500.00	60.00	-1.00
1	0.40	0.50	15.00	9.00	0.10	1.00	60.00	500.00	60.00	1.00
0	2.00	0.60	15.00	9.00	0.10	1.00	60.00	500.00	60.00	1.00
0	3.70	0.60	15.00	9.00	0.10	1.00	60.00	500.00	60.00	-1.00
1	1.40	0.70	15.00	9.50	0.10	1.00	60.00	500.00	59.00	-1.00
0	1.80	0.80	15.00	9.50	0.25	1.00	60.00	500.00	59.00	-1.00
0	2.80	0.90	15.00	9.50	0.25	1.00	60.00	500.00	59.00	-1.00
0	0.90	1.00	15.00	9.50	0.25	1.00	60.00	500.00	59.00	-1.00
0	3.70	1.10	15.00	9.50	0.25	1.00	60.00	500.00	58.00	-1.00
1	1.80	1.50	15.00	10.00	0.50	1.00	90.00	500.00	57.00	-1.00
0	2.70	1.50	15.00	10.00	0.50	1.00	90.00	500.00	56.00	1.00
0	3.10	1.50	15.00	10.00	0.50	1.00	90.00	500.00	56.00	-1.00
1	0.70	1.60	15.00	10.00	0.50	1.00	90.00	500.00	56.00	-1.00
0	3.00	1.70	15.00	10.00	0.50	1.00	90.00	500.00	55.00	-1.00
0	2.80	1.70	15.00	10.00	0.50	1.00	90.00	500.00	55.00	-1.00
0	3.00	1.80	15.00	10.00	0.50	1.00	90.00	500.00	55.00	1.00
0	1.00	1.80	15.00	10.00	0.50	1.00	90.00	500.00	54.00	-1.00
1	1.70	1.90	15.00	10.00	0.50	1.00	90.00	500.00	54.00	-1.00

41413 19 APRIL 79

1	2.70	0.00	15.00	4.00	0.30	0.50	26.00	57.00	0.00
0	1.00	0.00	15.00	4.00	0.30	0.50	26.00	57.00	2.00
1	0.40	0.30	15.00	4.00	0.30	0.50	26.00	59.00	2.00
1	0.30	0.50	15.00	4.00	0.30	0.50	26.00	60.00	0.00
0	1.80	0.90	15.00	5.00	0.25	0.50	26.00	60.00	0.00
1	1.70	0.90	15.00	5.00	0.25	0.50	26.00	60.00	2.00
0	1.20	0.70	15.00	5.00	0.25	0.50	26.00	60.00	2.00
1	0.90	1.40	15.00	5.00	0.25	0.50	26.00	60.00	2.00
0	3.00	1.50	15.00	5.00	0.25	0.50	26.00	59.00	2.00
1	0.50	1.60	15.00	5.00	0.25	0.50	26.00	59.00	0.00
0	2.10	1.80	15.00	6.50	0.30	0.50	26.00	59.00	2.00
0	2.50	1.80	15.00	6.50	0.30	0.50	26.00	59.00	0.00
0	3.80	1.90	15.00	6.50	0.30	0.50	26.00	59.00	0.00

PT KNOLL 19 APRIL 79

1	1.40	0.00	15.00	4.00	0.30	0.50	15.00	53.00	2.00
0	4.70	0.10	15.00	4.00	0.30	0.50	15.00	53.00	0.00
1	3.10	0.40	15.00	4.00	0.30	0.50	15.00	56.00	2.00
1	0.20	0.60	15.00	4.00	0.30	0.50	15.00	57.00	0.00
1	2.30	0.90	15.00	5.00	0.25	0.50	15.00	58.00	2.00
0	2.40	1.00	15.00	5.00	0.25	0.50	15.00	59.00	0.00
0	3.80	1.10	15.00	5.00	0.25	0.50	15.00	59.00	0.00
1	1.50	1.20	15.00	5.00	0.25	0.50	15.00	59.00	2.00
1	1.50	1.20	15.00	5.00	0.25	0.50	16.00	59.00	2.00
0	5.10	1.30	15.00	5.00	0.25	0.50	16.00	59.00	2.00
1	1.60	1.40	15.00	5.00	0.25	0.50	16.00	59.00	2.00
0	2.00	1.40	15.00	5.00	0.25	0.50	16.00	59.00	0.00
0	4.80	1.80	15.00	6.50	0.30	0.50	16.00	59.00	2.00
1	1.60	1.80	15.00	6.50	0.30	0.50	16.00	59.00	2.00
0	3.70	2.00	15.00	6.50	0.30	0.50	16.00	58.00	0.00
0	4.90	2.10	15.00	6.50	0.30	0.50	16.00	58.00	2.00
1	1.30	2.20	15.00	6.50	0.30	0.50	16.00	57.00	0.00
1	2.00	2.50	15.00	6.50	0.40	0.50	16.00	56.00	2.00
1	3.00	2.50	15.00	6.50	0.40	0.50	16.00	56.00	0.00
0	4.70	2.60	15.00	6.50	0.40	0.50	16.00	56.00	2.00
1	3.70	1.50	15.00	6.00	0.25	0.50	16.00	59.00	2.00

41441 19 APRIL 79

1	2.50	0.10	15.00	5.00	0.25	0.50	20.00	59.00	2.00
0	2.80	0.20	15.00	5.00	0.25	0.50	20.00	60.00	0.00
0	3.40	0.10	15.00	5.00	0.25	0.50	20.00	59.00	0.00
1	0.70	0.30	15.00	5.00	0.25	0.50	20.00	60.00	0.00
1	2.10	0.60	15.00	5.00	0.25	0.50	20.00	59.00	2.00
0	2.90	0.60	15.00	5.00	0.25	0.50	20.00	59.00	2.00
1	3.00	0.90	15.00	5.00	0.25	0.50	20.00	59.00	2.00
0	3.50	0.90	15.00	5.00	0.25	0.50	20.00	59.00	0.00
1	0.20	1.10	15.00	6.50	0.30	0.50	20.00	58.00	0.00
0	2.80	1.40	15.00	6.50	0.30	0.50	20.00	57.00	0.00
1	0.90	1.50	15.00	6.50	0.30	0.50	20.00	56.00	2.00
1	0.20	1.90	15.00	6.50	0.30	0.50	20.00	54.00	2.00
0	3.40	1.40	15.00	6.50	0.30	0.50	20.00	57.00	2.00
0	3.60	1.80	15.00	6.50	0.30	0.50	20.00	54.00	0.00

PT BONITA 19 APRIL 79

1	1.70	0.00	15.00	4.00	0.30	0.50	16.00	59.00	2.00
1	1.80	0.20	15.00	5.00	0.25	0.50	16.00	59.00	0.00
1	1.50	0.30	15.00	5.00	0.25	0.50	16.00	60.00	2.00
0	4.20	0.60	15.00	5.00	0.25	0.50	16.00	60.00	0.00
1	1.90	0.70	15.00	5.00	0.25	0.50	16.00	60.00	2.00
0	2.10	1.00	15.00	6.50	0.30	0.50	16.00	59.00	0.00
1	1.30	1.10	15.00	6.50	0.30	0.50	16.00	59.00	2.00
0	3.70	1.30	15.00	6.50	0.30	0.50	16.00	58.00	0.00
1	2.40	1.40	15.00	6.50	0.30	0.50	16.00	57.00	2.00
0	2.50	1.40	15.00	6.50	0.30	0.50	16.00	57.00	0.00
1	1.70	1.50	15.00	6.50	0.30	0.50	16.00	57.00	0.00
1	2.80	1.70	15.00	6.50	0.40	0.50	16.00	56.00	2.00
1	0.90	1.80	15.00	6.50	0.50	0.50	16.00	56.00	0.00
1	2.20	1.90	15.00	5.00	0.50	0.50	16.00	55.00	2.00
0	4.30	2.30	15.00	5.00	0.70	0.50	16.00	53.00	0.00
1	1.90	2.20	15.00	5.00	0.70	0.50	16.00	53.00	2.00
1	3.10	1.80	15.00	6.50	0.50	0.50	16.00	56.00	2.00

CAPE GEORGE 23 APRIL 79

1	1.00	0.00	9.50	4.00	0.20	1.00	14.20	60.00	1.00
1	0.90	1.20	11.50	7.50	0.10	2.00	14.20	62.00	0.00
1	1.20	1.60	11.50	7.50	0.10	2.00	14.20	60.00	1.00

44508 23 APRIL 79

0	2.10	1.20	11.50	7.50	0.10	2.00	10.00	59.00	0.00
0	1.00	2.00	13.00	9.00	0.10	2.00	10.00	54.00	0.00
0	0.90	2.10	13.00	9.00	0.10	2.00	10.00	55.00	0.00

PT KIBOLL 23 APRIL 79

0	3.00	0.50	9.50	4.00	0.10	1.00	16.20	59.00	0.00
1	1.10	0.80	9.50	4.00	0.10	1.00	16.20	60.00	1.00
1	0.30	1.50	10.00	7.00	0.10	1.00	16.20	61.00	0.00
1	1.20	2.70	13.00	9.00	0.10	2.00	16.20	56.00	1.00

41385 23 APRIL 79

1	1.90	0.30	9.50	4.00	0.20	1.00	12.00	59.00	0.00
0	1.70	0.70	9.50	4.00	0.20	1.00	12.00	60.00	0.00
0	1.80	1.10	9.50	4.00	0.20	1.00	12.00	61.00	0.00
0	2.30	1.40	9.50	4.00	0.10	1.00	12.00	62.00	1.00
1	0.30	2.50	13.00	9.00	0.10	2.00	16.00	57.00	0.00
0	1.80	3.10	13.00	9.00	0.10	2.00	16.00	54.00	1.00

HC130 24 APRIL 79

1	1.20	0.10	15.00	4.00	0.10	0.50	180.00	1000.00	59.00	1.00
1	1.90	0.20	15.00	4.00	0.10	0.50	180.00	1000.00	58.00	-1.00
0	4.50	0.30	15.00	6.50	0.20	0.50	180.00	1000.00	57.00	1.00
1	0.60	0.40	15.00	6.50	0.20	0.50	180.00	1000.00	57.00	-1.00
1	2.20	0.50	15.00	6.50	0.20	0.50	180.00	1000.00	56.00	-1.00
0	1.30	0.50	15.00	6.50	0.20	0.50	180.00	1000.00	55.00	1.00
0	0.60	0.50	15.00	6.50	0.20	0.50	180.00	1000.00	55.00	1.00

HH3 24 APRIL 79

1	1.60	0.10	15.00	3.50	0.10	0.00	120.00	500.00	57.00	1.00
1	2.60	0.30	15.00	3.50	0.10	0.00	120.00	500.00	57.00	-1.00
0	3.60	0.50	15.00	3.50	0.10	0.00	120.00	500.00	59.00	1.00
1	1.00	0.60	15.00	4.50	0.05	0.00	90.00	500.00	60.00	1.00
1	2.90	0.90	15.00	4.50	0.05	0.00	90.00	500.00	61.00	-1.00
0	1.80	1.10	15.00	10.00	0.20	0.50	120.00	500.00	47.00	-1.00
0	3.10	1.10	15.00	10.00	0.20	0.50	120.00	500.00	47.00	-1.00
1	0.80	1.10	15.00	11.00	0.20	0.50	120.00	500.00	46.00	-1.00
1	0.90	1.20	15.00	11.50	0.20	0.50	120.00	500.00	45.00	1.00
0	4.20	1.40	15.00	6.00	0.20	0.50	90.00	500.00	39.00	-1.00
1	0.50	1.50	15.00	6.00	0.20	0.50	90.00	500.00	39.00	-1.00
1	2.40	1.70	15.00	6.00	0.20	0.50	90.00	500.00	37.00	-1.00
0	3.90	1.60	15.00	6.00	0.20	0.50	90.00	500.00	37.00	1.00
0	2.10	1.80	15.00	6.00	0.20	0.50	90.00	500.00	35.00	1.00

HH52A 24 APRIL 79

1	2.20	0.10	15.00	4.00	0.10	0.50	60.00	500.00	60.00	1.00
1	1.10	0.30	15.00	4.00	0.10	0.50	60.00	500.00	59.00	-1.00
1	0.30	0.60	15.00	6.50	0.20	0.50	60.00	500.00	58.00	1.00
0	5.20	0.70	15.00	6.50	0.20	0.50	60.00	500.00	57.00	1.00
1	4.10	0.80	15.00	6.50	0.20	0.50	60.00	500.00	57.00	-1.00
1	0.70	1.10	15.00	6.00	0.20	0.50	60.00	500.00	34.00	-1.00
1	0.30	1.30	15.00	6.00	0.20	0.50	60.00	500.00	32.00	1.00
0	2.80	1.40	15.00	6.00	0.20	0.50	60.00	500.00	31.00	1.00
0	3.40	1.50	15.00	6.00	0.20	0.50	60.00	500.00	30.00	-1.00
0	0.70	1.90	15.00	8.00	0.10	0.50	60.00	500.00	25.00	1.00
0	4.10	2.00	15.00	8.00	0.10	0.50	60.00	500.00	25.00	1.00
0	5.20	2.00	15.00	8.00	0.10	0.50	60.00	500.00	24.00	-1.00
0	3.30	2.10	15.00	8.00	0.10	0.50	60.00	500.00	23.00	1.00
1	1.00	2.30	15.00	8.00	0.10	0.50	60.00	500.00	21.00	-1.00

HU16 25 APRIL 79

1	1.20	0.00	3.50	6.00	1.00	0.00	150.00	1000.00	61.00	1.00
0	4.10	0.10	3.50	6.00	1.00	0.00	150.00	1000.00	61.00	1.00
1	0.90	0.10	3.50	6.00	1.00	0.00	150.00	1000.00	61.00	-1.00
1	0.10	0.20	3.50	6.00	1.00	0.00	150.00	1000.00	62.00	-1.00
1	3.10	0.30	3.50	6.00	1.00	0.00	150.00	1000.00	62.00	1.00
1	1.20	0.30	3.50	6.00	1.00	0.00	150.00	1000.00	62.00	1.00
0	1.50	0.40	3.50	6.00	1.00	0.00	150.00	1000.00	62.00	-1.00
0	1.70	0.40	3.50	6.00	1.00	0.00	150.00	1000.00	62.00	1.00
0	4.00	0.60	3.50	6.00	1.00	0.00	120.00	1000.00	62.00	-1.00
0	1.90	0.70	3.50	6.00	1.00	0.00	120.00	1000.00	62.00	1.00
0	4.80	0.70	3.50	6.00	1.00	0.00	120.00	1000.00	62.00	1.00
0	1.90	0.70	3.50	6.00	1.00	0.00	120.00	1000.00	62.00	-1.00
1	1.50	0.80	4.00	4.00	1.00	0.00	120.00	1000.00	61.00	1.00
0	3.50	0.90	4.00	4.00	1.00	0.00	120.00	1000.00	61.00	1.00
1	1.10	0.90	4.00	4.00	1.00	0.00	120.00	1000.00	61.00	-1.00
0	4.80	1.10	3.00	3.50	1.00	0.00	150.00	1000.00	45.00	-1.00
1	0.50	1.10	3.00	3.50	1.00	0.00	150.00	1000.00	45.00	1.00
1	0.30	1.30	3.00	3.50	1.00	0.00	150.00	1000.00	44.00	1.00
0	2.10	1.40	3.00	3.50	1.00	0.00	150.00	1000.00	42.00	-1.00
0	3.60	1.50	3.00	3.50	1.00	0.00	150.00	1000.00	41.00	1.00
0	1.80	1.50	3.00	3.50	1.00	0.00	150.00	1000.00	41.00	-1.00
1	0.30	1.60	3.00	3.50	1.00	0.00	150.00	1000.00	40.00	-1.00
0	0.90	1.60	3.00	3.50	1.00	0.00	150.00	1000.00	40.00	1.00
1	0.10	1.60	3.00	3.50	1.00	0.00	150.00	1000.00	39.00	-1.00
0	2.80	1.70	3.00	3.50	1.00	0.00	150.00	1000.00	39.00	-1.00
0	1.10	1.80	3.00	3.50	1.00	0.00	150.00	1000.00	38.00	1.00
0	2.20	1.80	3.00	3.50	1.00	0.00	150.00	1000.00	38.00	-1.00
0	2.10	1.80	3.00	3.50	1.00	0.00	120.00	1000.00	37.00	-1.00
1	0.10	1.90	3.00	3.50	1.00	0.00	120.00	1000.00	36.00	1.00
0	3.10	1.90	3.00	2.50	1.00	0.00	120.00	1000.00	36.00	-1.00
0	3.00	2.00	3.00	2.50	1.00	0.00	120.00	1000.00	35.00	-1.00
0	0.60	2.00	3.00	2.50	1.00	0.00	120.00	1000.00	35.00	-1.00
0	0.90	2.10	3.00	2.50	1.00	0.00	120.00	1000.00	34.00	1.00
1	0.20	2.10	3.00	2.50	1.00	0.00	120.00	1000.00	34.00	-1.00
0	1.80	2.20	3.00	2.50	1.00	0.00	120.00	1000.00	33.00	-1.00
0	2.70	2.20	3.00	2.50	1.00	0.00	120.00	1000.00	32.00	1.00
0	3.90	2.20	3.00	2.50	1.00	0.00	120.00	1000.00	32.00	1.00
0	1.80	2.30	3.00	2.50	1.00	0.00	120.00	1000.00	31.00	-1.00
0	2.00	2.40	3.00	2.50	1.00	0.00	120.00	1000.00	31.00	1.00
0	4.00	1.50	3.00	2.50	1.00	0.00	120.00	1000.00	30.00	-1.00
1	0.30	2.60	3.00	2.50	1.00	0.00	120.00	1000.00	28.00	1.00
1	2.00	1.00	4.00	4.00	1.00	0.00	120.00	1000.00	60.00	-1.00
0	2.10	1.00	4.00	4.00	1.00	0.00	120.00	1000.00	60.00	1.00
0	4.00	1.30	3.00	3.50	1.00	0.00	150.00	1000.00	44.00	-1.00
0	2.90	1.50	3.00	3.50	1.00	0.00	150.00	1000.00	41.00	1.00
0	3.80	2.30	3.00	2.50	1.00	0.00	120.00	1000.00	31.00	-1.00

HC130 25 APRIL 79

1	1.00	0.00	4.50	4.00	0.95	0.00	180.00	1000.00	54.00	1.00
0	2.40	0.10	4.50	4.00	0.95	0.00	180.00	1000.00	55.00	-1.00
0	1.50	0.10	4.50	4.00	0.95	0.00	180.00	1000.00	55.00	-1.00
0	2.80	0.20	4.50	4.00	0.95	0.00	180.00	1000.00	55.00	1.00
0	2.90	0.20	4.50	4.00	0.95	0.00	180.00	1000.00	55.00	1.00
1	2.70	0.20	4.50	4.00	0.95	0.00	180.00	1000.00	56.00	-1.00
1	1.20	0.30	4.50	4.00	0.95	0.00	180.00	1000.00	56.00	1.00
0	1.80	0.40	4.50	4.00	0.95	0.00	150.00	1000.00	57.00	1.00
1	0.40	0.40	4.50	4.00	0.95	0.00	150.00	1000.00	57.00	-1.00
0	3.70	0.50	4.50	4.00	0.95	0.00	150.00	1000.00	57.00	1.00
0	3.60	0.50	4.50	4.00	0.95	0.00	150.00	1000.00	57.00	-1.00
0	2.20	0.50	4.50	4.00	0.95	0.00	150.00	1000.00	58.00	1.00
0	1.90	0.50	4.50	4.00	0.95	0.00	150.00	1000.00	58.00	-1.00
0	2.00	0.60	4.50	4.00	0.95	0.00	150.00	1000.00	59.00	-1.00
0	0.40	0.70	4.50	4.00	0.95	0.00	150.00	1000.00	59.00	1.00
1	0.80	0.70	4.00	4.00	1.00	0.00	180.00	1000.00	58.00	1.00
0	2.10	0.80	4.00	4.00	1.00	0.00	180.00	1000.00	58.00	-1.00
1	0.30	0.90	4.00	4.00	1.00	0.00	180.00	1000.00	57.00	-1.00
0	1.30	0.90	4.00	4.00	1.00	0.00	180.00	1000.00	56.00	1.00
0	1.80	0.90	4.00	4.00	1.00	0.00	180.00	1000.00	56.00	-1.00
1	0.30	0.90	4.00	4.00	1.00	0.00	180.00	1000.00	56.00	-1.00
0	2.30	1.00	4.00	4.00	1.00	0.00	180.00	1000.00	55.00	1.00
0	1.80	1.00	4.00	4.00	1.00	0.00	180.00	1000.00	55.00	-1.00
0	3.80	1.10	4.00	4.00	1.00	0.00	180.00	1000.00	54.00	-1.00
1	0.30	1.10	4.00	4.00	1.00	0.00	180.00	1000.00	54.00	1.00
0	2.10	1.10	4.00	4.00	1.00	0.00	180.00	1000.00	54.00	-1.00
0	1.50	1.20	4.00	4.00	1.00	0.00	180.00	1000.00	53.00	1.00
0	1.30	1.30	4.00	4.00	1.00	0.00	150.00	1000.00	52.00	1.00
0	2.00	1.30	4.00	4.00	1.00	0.00	150.00	1000.00	52.00	-1.00
1	0.60	1.40	4.00	4.00	1.00	0.00	150.00	1000.00	51.00	1.00
0	2.60	1.50	4.00	4.00	1.00	0.00	150.00	1000.00	50.00	1.00
0	4.10	1.50	4.00	4.00	1.00	0.00	150.00	1000.00	50.00	1.00
0	0.00	1.60	4.00	4.00	1.00	0.00	150.00	1000.00	49.00	-1.00
0	2.10	1.60	4.00	4.00	1.00	0.00	150.00	1000.00	49.00	1.00
1	0.20	1.80	4.00	4.00	1.00	0.00	150.00	1000.00	47.00	1.00

HH52 25 APRIL 79

0	0.80	0.00	3.50	6.00	1.00	0.00	90.00	500.00	62.00	1.00
0	1.30	0.10	3.50	6.00	1.00	0.00	90.00	500.00	62.00	-1.00
0	1.00	0.10	3.50	6.00	1.00	0.00	90.00	500.00	62.00	-1.00
0	5.50	0.20	3.50	6.00	1.00	0.00	90.00	500.00	62.00	-1.00
1	0.90	0.20	3.50	6.00	1.00	0.00	90.00	500.00	62.00	1.00
1	0.90	0.30	3.50	6.00	1.00	0.00	90.00	500.00	62.00	-1.00
0	4.10	0.40	3.50	6.00	1.00	0.00	90.00	500.00	62.00	1.00
0	6.00	0.10	3.50	6.00	1.00	0.00	90.00	500.00	62.00	1.00
0	2.50	0.60	3.50	6.00	1.00	0.00	60.00	500.00	62.00	1.00
0	1.20	0.60	3.50	6.00	1.00	0.00	60.00	500.00	61.00	-1.00
1	0.20	0.70	3.50	6.00	1.00	0.00	60.00	500.00	61.00	1.00
0	2.00	0.90	4.00	4.00	1.00	0.00	60.00	500.00	60.00	-1.00
0	2.60	1.00	4.00	4.00	1.00	0.00	60.00	500.00	60.00	1.00
1	1.80	1.00	4.00	4.00	1.00	0.00	60.00	500.00	60.00	1.00
0	5.70	1.10	4.00	4.00	1.00	0.00	60.00	500.00	59.00	1.00
1	0.00	1.10	4.00	4.00	1.00	0.00	60.00	500.00	59.00	-1.00
0	3.10	1.30	4.00	4.00	1.00	0.00	60.00	500.00	58.00	-1.00
0	4.90	0.80	4.00	4.00	1.00	0.00	60.00	500.00	51.00	-1.00
0	1.40	1.50	3.00	3.50	1.00	0.00	60.00	500.00	45.00	-1.00
0	4.20	1.70	3.00	3.50	1.00	0.00	60.00	500.00	41.00	-1.00
1	2.20	1.70	3.00	3.50	1.00	0.00	60.00	500.00	40.00	1.00
1	0.90	1.80	3.00	3.50	1.00	0.00	60.00	500.00	39.00	1.00
0	3.00	1.90	3.00	3.50	1.00	0.00	60.00	500.00	36.00	1.00
0	1.80	2.00	3.00	3.50	1.00	0.00	60.00	500.00	36.00	1.00
0	2.30	2.10	3.00	3.50	1.00	0.00	60.00	500.00	36.00	-1.00
0	5.00	2.00	3.00	3.50	1.00	0.00	60.00	500.00	38.00	-1.00
0	3.10	1.70	3.00	3.50	1.00	0.00	60.00	500.00	41.00	1.00
0	2.50	2.30	3.00	2.50	1.00	0.00	90.00	500.00	34.00	1.00
0	4.80	2.40	3.00	2.50	1.00	0.00	90.00	500.00	33.00	1.00
0	2.50	2.40	3.00	2.50	1.00	0.00	90.00	500.00	33.00	-1.00
1	4.00	2.50	3.00	2.50	1.00	0.00	90.00	500.00	32.00	1.00
0	2.40	2.50	3.00	2.50	1.00	0.00	90.00	500.00	32.00	1.00
1	0.80	2.70	3.00	2.50	1.00	0.00	90.00	500.00	30.00	1.00
0	4.10	2.10	3.00	3.50	1.00	0.00	60.00	500.00	36.00	1.00
0	6.00	1.50	3.00	3.50	1.00	0.00	60.00	500.00	43.00	1.00

PT JACKSON 26 APRIL 79

0	1.50	0.50	2.00	6.00	1.00	0.50	12.00	60.00	2.00
0	1.10	1.00	3.00	7.00	1.00	0.50	12.00	61.00	1.00
1	1.90	1.30	3.00	7.00	1.00	0.50	12.00	62.00	2.00
0	2.30	1.60	3.00	7.00	1.00	0.50	12.00	62.00	0.00
0	2.20	1.90	3.00	10.00	1.00	0.50	12.00	53.00	2.00
0	1.20	2.60	3.00	10.00	1.00	0.50	12.00	45.00	2.00
0	1.40	2.80	3.00	10.00	1.00	0.50	12.00	44.00	0.00
0	1.20	3.40	3.00	10.00	1.00	0.50	12.00	37.00	0.00
0	1.20	3.60	3.00	10.00	1.00	0.50	12.00	35.00	2.00

CAPE FAIRWEATHER 26 APRIL 79

1	0.90	0.20	2.00	6.00	1.00	0.50	12.00	57.00	1.00
0	1.20	1.20	3.00	7.00	1.00	0.50	12.00	61.00	2.00
0	1.20	1.30	3.00	7.00	1.00	0.50	12.00	62.00	2.00
0	1.80	1.60	3.00	7.00	1.00	0.50	12.00	62.00	2.00
0	1.30	1.90	3.00	7.00	1.00	0.50	12.00	62.00	0.00
0	1.20	3.20	3.00	10.00	1.00	0.50	12.00	55.00	2.00
0	1.70	4.00	3.00	10.00	1.00	0.50	12.00	47.00	2.00
0	1.00	4.10	3.00	10.00	1.00	0.50	12.00	46.00	0.00
0	1.30	5.30	3.00	10.00	1.00	0.50	12.00	33.00	1.00

44552 30 APRIL 79

1	0.10	0.00	12.00	3.00	0.30	1.00	10.00	51.00	0.00
0	2.00	0.50	12.00	3.00	0.30	1.00	10.00	54.00	2.00
0	1.20	0.50	12.00	3.00	0.30	1.00	10.00	54.00	1.00
0	1.60	0.80	12.00	3.00	0.30	1.00	10.00	58.00	2.00
0	1.70	0.90	12.00	3.00	0.30	1.00	10.00	58.00	1.00
1	1.80	1.30	12.00	3.00	0.20	1.00	10.00	61.00	2.00
1	0.40	2.10	10.00	5.00	0.10	1.50	11.00	63.00	0.00
0	1.70	2.40	10.00	5.00	0.05	1.50	11.00	63.00	1.00
1	0.40	2.60	10.00	5.00	0.05	1.50	11.00	62.00	2.00
1	0.30	3.20	10.00	11.00	0.00	1.50	11.00	59.00	0.00

CAPE FAIRWEATHER 30 APRIL 79

1	0.50	0.00	12.00	3.00	0.30	1.00	13.50	53.00	1.00
1	0.20	0.20	12.00	3.00	0.30	1.00	13.50	55.00	1.00
1	0.80	0.70	12.00	3.00	0.30	1.00	13.50	59.00	0.00
1	0.80	1.30	10.00	5.00	0.10	1.00	13.50	62.00	2.00
1	0.40	1.60	10.00	5.00	0.10	1.00	13.50	63.00	0.00
1	0.30	1.70	10.00	5.00	0.10	1.00	13.50	64.00	2.00
1	0.70	1.80	10.00	5.00	0.05	1.00	13.50	64.00	0.00
0	2.10	1.80	10.00	5.00	0.05	1.00	13.50	63.00	2.00
1	0.50	1.90	10.00	5.00	0.05	1.00	13.50	63.00	1.00
1	0.20	2.20	10.00	5.00	0.05	1.50	13.50	63.00	1.00
1	0.10	2.50	10.00	5.00	0.05	1.50	13.50	61.00	2.00
1	0.00	3.20	10.00	11.00	0.00	1.50	13.50	57.00	0.00

41342 30 APRIL 79

0	1.20	0.00	11.00	3.00	0.20	1.00	21.00	60.00	0.00
1	1.70	0.00	11.00	3.00	0.20	1.00	21.00	60.00	2.00
1	0.20	0.20	11.00	3.00	0.20	1.00	21.00	61.00	1.00
1	0.30	0.40	11.00	3.00	0.20	1.00	21.00	62.00	1.00
1	0.50	0.60	11.00	3.00	0.20	1.00	21.00	63.00	2.00
1	0.40	1.00	11.00	3.00	0.20	1.00	21.00	63.00	0.00
1	0.60	1.20	10.00	5.00	0.05	1.50	21.00	62.00	0.00
1	0.00	1.40	10.00	7.00	0.05	1.50	21.00	60.00	1.00
0	1.20	1.50	10.00	11.00	0.05	1.50	21.00	60.00	1.00
1	0.10	1.70	10.00	11.00	0.05	1.50	21.00	59.00	0.00
1	0.80	1.90	10.00	11.00	0.05	1.50	21.00	58.00	2.00

CAPE HORN 30 APRIL 79

0	3.10	0.10	12.00	3.00	0.30	1.00	13.00	50.00	2.00
1	0.40	0.20	12.00	3.00	0.30	1.00	13.00	51.00	0.00
0	3.10	0.60	12.00	3.00	0.30	1.00	13.00	54.00	2.00
1	0.10	0.50	12.00	3.00	0.30	1.00	13.00	54.00	1.00
1	0.60	0.70	12.00	3.00	0.30	1.00	13.00	56.00	2.00
0	2.70	0.80	12.00	3.00	0.30	1.00	13.00	57.00	0.00
1	0.80	1.10	12.00	4.00	0.30	1.00	13.00	59.00	0.00
1	1.60	1.10	12.00	4.00	0.20	1.00	13.00	59.00	2.00
1	0.40	1.20	12.00	4.00	0.20	1.00	13.00	61.00	1.00
1	0.20	1.60	10.00	5.00	0.20	1.00	13.50	62.00	1.00
1	0.10	1.70	10.00	5.00	0.10	1.00	13.50	62.00	1.00
1	0.60	2.10	10.00	5.00	0.10	1.00	13.50	64.00	0.00
1	1.00	2.60	10.00	5.00	0.10	0.50	13.50	64.00	2.00
1	0.80	2.90	10.00	5.00	0.10	0.50	13.50	63.00	0.00
1	1.70	3.00	10.00	5.00	0.10	0.50	13.50	62.00	2.00

HMS2 1 MAY 79

1	1.30	0.10	15.00	11.00	0.00	1.00	90.00	500.00	61.00	-1.00
1	1.90	0.20	15.00	11.00	0.00	1.00	90.00	500.00	61.00	1.00
0	3.00	0.40	15.00	11.00	0.00	1.00	90.00	500.00	63.00	1.00
1	0.30	0.80	15.00	12.00	0.05	1.50	60.00	500.00	64.00	-1.00
0	1.80	1.00	15.00	12.00	0.05	1.50	60.00	500.00	64.00	-1.00
1	1.40	1.20	15.00	13.00	0.05	1.50	60.00	500.00	64.00	-1.00
1	0.70	1.30	15.00	13.00	0.05	1.50	60.00	500.00	63.00	1.00
0	2.00	0.70	15.00	12.00	0.05	1.50	60.00	500.00	64.00	1.00
0	3.00	1.70	15.00	11.00	0.00	2.00	90.00	500.00	50.00	1.00
1	1.30	1.70	15.00	11.00	0.00	2.00	90.00	500.00	49.00	-1.00
1	0.60	1.80	15.00	11.00	0.00	2.00	90.00	500.00	48.00	1.00
1	1.70	1.90	15.00	11.00	0.00	2.00	90.00	500.00	47.00	1.00
1	0.60	2.30	15.00	11.00	0.00	2.00	60.00	500.00	42.00	1.00
0	2.50	2.50	15.00	11.00	0.00	2.00	60.00	500.00	40.00	1.00
1	1.10	2.60	15.00	11.00	0.00	2.00	60.00	500.00	39.00	-1.00
0	1.50	2.70	15.00	11.00	0.00	2.00	60.00	500.00	38.00	-1.00
1	0.90	2.80	15.00	11.00	0.00	2.00	60.00	500.00	37.00	1.00
0	1.80	2.90	15.00	11.00	0.00	2.00	60.00	500.00	35.00	-1.00

1	0.80	0.10	9.00	10.00	0.30	0.50	120.00	500.00	55.00	-1.00
1	2.80	0.10	9.00	10.00	0.30	0.50	120.00	500.00	53.00	1.00
1	0.50	0.20	9.00	10.00	0.30	0.50	120.00	500.00	54.00	-1.00
0	0.10	0.00	9.00	10.00	0.30	0.50	120.00	500.00	53.00	1.00
0	3.30	0.30	10.00	10.00	0.30	0.50	120.00	500.00	55.00	-1.00
0	1.80	0.30	10.00	10.00	0.30	0.50	120.00	500.00	55.00	1.00
0	4.50	0.00	9.00	10.00	0.30	0.50	120.00	500.00	53.00	-1.00
0	1.30	0.30	11.00	10.00	0.20	1.00	90.00	500.00	56.00	1.00
1	1.90	0.40	11.00	10.00	0.20	1.00	90.00	500.00	57.00	-1.00
1	4.20	0.50	12.00	10.00	0.20	1.00	90.00	500.00	57.00	-1.00
0	4.70	0.40	12.00	10.00	0.20	1.00	90.00	500.00	57.00	1.00
0	3.40	0.50	12.00	10.00	0.10	1.00	90.00	500.00	58.00	1.00
1	0.70	0.50	12.00	10.00	0.10	1.00	90.00	500.00	58.00	-1.00
1	2.20	0.60	12.00	10.00	0.10	1.00	90.00	500.00	59.00	1.00
0	3.50	0.70	13.00	10.00	0.10	1.00	90.00	500.00	59.00	-1.00
0	6.20	0.10	9.00	10.00	0.30	0.50	120.00	500.00	53.00	1.00
0	4.20	0.70	15.00	13.00	0.00	2.00	120.00	500.00	62.00	-1.00
0	0.70	0.70	15.00	13.00	0.00	2.00	120.00	500.00	62.00	1.00
1	0.80	0.70	15.00	13.00	0.00	2.00	120.00	500.00	62.00	-1.00
0	1.90	0.80	15.00	13.00	0.00	2.00	120.00	500.00	61.00	-1.00
0	2.30	0.80	15.00	13.00	0.00	2.00	120.00	500.00	61.00	-1.00
0	0.60	0.90	15.00	13.00	0.00	2.00	120.00	500.00	61.00	-1.00
0	3.30	1.00	15.00	13.00	0.00	2.00	120.00	500.00	60.00	-1.00
0	5.20	1.00	15.00	13.00	0.00	2.00	120.00	500.00	60.00	-1.00
1	1.10	1.00	15.00	13.00	0.00	2.00	120.00	500.00	60.00	1.00
1	1.10	1.10	15.00	13.00	0.00	2.00	120.00	500.00	60.00	-1.00
0	3.70	1.20	15.00	13.00	0.00	2.00	120.00	500.00	59.00	-1.00
0	3.50	1.20	15.00	13.00	0.00	2.00	120.00	500.00	59.00	1.00
0	2.60	0.80	15.00	13.00	0.00	2.00	120.00	500.00	61.00	1.00
1	1.60	1.30	15.00	14.00	0.00	2.00	90.00	500.00	58.00	-1.00
0	5.70	1.30	15.00	14.00	0.00	2.00	90.00	500.00	58.00	1.00
0	3.30	1.40	15.00	14.00	0.00	2.00	90.00	500.00	57.00	1.00
0	0.60	1.50	15.00	14.00	0.00	2.00	90.00	500.00	57.00	1.00
0	4.00	1.50	15.00	14.00	0.00	2.00	90.00	500.00	57.00	-1.00
0	3.80	1.50	15.00	15.00	0.00	2.00	90.00	500.00	56.00	-1.00
0	3.90	1.50	15.00	15.00	0.00	2.00	90.00	500.00	56.00	1.00
0	1.60	1.60	15.00	15.00	0.00	2.00	90.00	500.00	56.00	-1.00
0	1.80	1.60	15.00	15.00	0.00	2.00	90.00	500.00	56.00	1.00
0	3.20	1.60	15.00	15.00	0.00	2.00	90.00	500.00	55.00	-1.00
0	4.10	1.70	15.00	15.00	0.00	2.00	90.00	500.00	55.00	1.00
0	0.80	1.70	15.00	15.00	0.00	2.00	90.00	500.00	55.00	-1.00
0	1.30	1.70	15.00	15.00	0.00	2.00	90.00	500.00	55.00	1.00
0	3.20	1.80	15.00	15.00	0.00	2.00	90.00	500.00	54.00	-1.00
0	5.40	1.90	15.00	15.00	0.00	2.00	90.00	500.00	53.00	-1.00
0	5.50	0.90	15.00	15.00	0.00	2.00	120.00	500.00	61.00	1.00
0	6.00	1.10	15.00	15.00	0.00	2.00	120.00	500.00	60.00	1.00
0	6.00	1.60	15.00	15.00	0.00	2.00	90.00	500.00	56.00	-1.00

HC130 1 MAY 79

1	0.30	0.00	14.00	11.00	0.20	0.50	180.00	1000.00	61.00	1.00
1	0.90	0.10	14.00	11.00	0.20	0.50	180.00	1000.00	61.00	-1.00
1	1.10	0.10	14.00	11.00	0.10	0.50	180.00	1000.00	61.00	-1.00
0	2.30	0.20	14.00	11.00	0.10	0.50	180.00	1000.00	61.00	-1.00
0	2.30	0.20	15.00	11.00	0.10	1.00	180.00	1000.00	61.00	1.00
0	0.40	0.30	15.00	11.00	0.00	1.00	180.00	1000.00	61.00	-1.00
1	0.50	0.30	15.00	11.00	0.00	1.00	180.00	1000.00	62.00	1.00
1	1.60	0.40	15.00	11.00	0.00	1.00	180.00	1000.00	62.00	-1.00
1	1.30	0.50	15.00	11.00	0.00	1.00	180.00	1000.00	62.00	1.00
0	1.30	0.50	15.00	11.00	0.00	1.00	180.00	1000.00	62.00	1.00
1	1.20	0.70	15.00	12.00	0.00	1.00	150.00	1000.00	64.00	-1.00
0	0.60	0.70	15.00	12.00	0.00	1.00	150.00	1000.00	64.00	1.00
1	0.70	0.80	15.00	12.00	0.05	1.50	150.00	1000.00	64.00	-1.00
0	2.10	0.90	15.00	13.00	0.05	1.50	150.00	1000.00	64.00	1.00
1	1.00	1.00	15.00	13.00	0.05	1.50	150.00	1000.00	64.00	-1.00
1	0.20	1.10	15.00	11.00	0.00	2.00	180.00	1000.00	42.00	1.00
1	0.60	1.10	15.00	11.00	0.00	2.00	180.00	1000.00	42.00	-1.00
0	1.40	1.20	15.00	11.00	0.00	2.00	180.00	1000.00	42.00	-1.00
0	2.40	1.20	15.00	11.00	0.00	2.00	180.00	1000.00	42.00	1.00
1	0.60	1.30	15.00	11.00	0.00	2.00	180.00	1000.00	41.00	1.00
0	1.40	1.40	15.00	11.00	0.00	2.00	180.00	1000.00	40.00	1.00
0	2.30	1.50	15.00	11.00	0.00	2.00	150.00	1000.00	40.00	-1.00
0	0.50	1.50	15.00	11.00	0.00	2.00	180.00	1000.00	40.00	-1.00

HH52 2 MAY 79

0	1.90	0.00	15.00	10.00	0.00	0.50	90.00	500.00	59.00	-1.00
1	0.40	0.30	15.00	10.00	0.00	0.50	90.00	500.00	65.00	1.00
1	0.00	0.80	15.00	12.00	0.00	1.00	60.00	500.00	65.00	1.00
0	1.90	1.10	15.00	15.00	0.00	1.00	60.00	500.00	66.00	-1.00
0	1.10	1.40	15.00	17.00	0.00	1.00	90.00	500.00	58.00	-1.00
0	1.70	2.50	15.00	10.00	0.00	1.50	60.00	500.00	47.00	1.00
0	1.70	2.60	15.00	10.00	0.00	1.50	60.00	500.00	47.00	1.00
0	1.30	2.60	15.00	10.00	0.00	1.50	60.00	500.00	46.00	1.00
0	0.00	2.90	15.00	12.00	0.00	1.50	60.00	500.00	43.00	-1.00

HU16 2 MAY 79

0	1.60	0.20	15.00	10.00	0.00	0.50	150.00	1000.00	56.00	1.00
0	1.20	0.30	15.00	10.00	0.00	0.50	150.00	1000.00	59.00	-1.00
1	1.40	0.40	15.00	10.00	0.00	0.50	150.00	1000.00	60.00	1.00
0	1.80	0.50	15.00	10.00	0.00	0.50	120.00	1000.00	61.00	1.00
1	0.90	0.60	15.00	10.00	0.00	0.50	120.00	1000.00	62.00	-1.00
0	2.20	0.70	15.00	10.00	0.00	0.50	120.00	1000.00	62.00	1.00
1	0.40	1.00	15.00	12.00	0.00	1.00	150.00	1000.00	54.00	1.00
0	1.10	1.20	15.00	11.00	0.00	1.00	150.00	1000.00	52.00	1.00
0	1.30	1.50	15.00	10.00	0.00	1.00	150.00	1000.00	49.00	-1.00
1	0.20	1.60	15.00	10.00	0.00	1.00	150.00	1000.00	48.00	-1.00
1	0.70	1.80	15.00	11.00	0.00	1.00	120.00	1000.00	45.00	-1.00
0	1.30	1.90	15.00	11.00	0.00	1.00	120.00	1000.00	44.00	-1.00
0	1.10	2.30	15.00	13.00	0.00	2.00	120.00	1000.00	40.00	1.00
0	0.70	2.40	15.00	13.00	0.00	2.00	120.00	1000.00	38.00	1.00

HC130 2 MAY 79

0	1.20	0.00	15.00	4.00	0.00	0.50	180.00	1000.00	49.00	-1.00
0	2.30	0.10	15.00	4.00	0.00	0.50	180.00	1000.00	50.00	1.00
0	2.70	0.20	15.00	4.00	0.00	0.50	180.00	1000.00	51.00	-1.00
0	1.50	0.30	15.00	4.00	0.00	0.50	180.00	1000.00	51.00	1.00
0	1.30	0.30	15.00	6.00	0.00	0.50	150.00	1000.00	54.00	1.00
1	2.50	0.40	15.00	6.00	0.00	0.50	150.00	1000.00	54.00	-1.00
0	2.60	0.40	15.00	6.00	0.00	0.50	150.00	1000.00	55.00	1.00
0	1.40	0.50	15.00	7.00	0.00	0.50	150.00	1000.00	56.00	-1.00
0	2.90	0.80	15.00	14.00	0.00	1.00	180.00	1000.00	62.00	-1.00
0	2.90	0.80	15.00	14.00	0.00	1.00	180.00	1000.00	62.00	1.00
1	0.90	0.90	15.00	14.00	0.00	1.00	180.00	1000.00	61.00	1.00
1	0.80	0.90	15.00	14.00	0.00	1.00	180.00	1000.00	61.00	-1.00
1	1.10	1.00	15.00	14.00	0.00	1.00	180.00	1000.00	61.00	-1.00
0	2.40	1.30	15.00	15.00	0.00	1.00	150.00	1000.00	59.00	-1.00
0	2.60	1.30	15.00	15.00	0.00	1.00	150.00	1000.00	58.00	1.00
0	0.50	1.50	15.00	15.00	0.00	1.00	150.00	1000.00	58.00	-1.00
0	3.70	1.50	15.00	15.00	0.00	1.00	150.00	1000.00	57.00	-1.00
0	1.50	1.50	15.00	15.00	0.00	1.00	150.00	1000.00	57.00	-1.00

41337 3 MAY 79

0	2.40	0.10	15.00	3.00	0.30	0.50	20.00	49.00	1.00
1	0.30	0.30	15.00	3.00	0.30	0.50	20.00	52.00	2.00
1	0.50	0.60	15.00	3.00	0.30	0.50	20.00	55.00	0.00
1	1.40	1.20	10.00	4.00	0.80	0.50	20.00	63.00	0.00
0	1.70	1.50	10.00	4.00	0.80	0.50	20.00	64.00	1.00
0	2.20	1.90	9.00	4.00	0.90	1.00	20.00	64.00	0.00

41441 3 MAY 79

1	0.00	0.10	15.00	3.00	0.30	0.50	20.00	58.00	2.00
0	1.80	0.60	15.00	3.00	0.40	0.50	20.00	61.00	1.00
1	1.40	0.90	12.00	3.00	0.70	0.50	20.00	62.00	0.00
1	1.10	1.40	10.00	4.00	0.80	0.50	20.00	64.00	2.00
0	1.80	1.60	9.00	4.00	0.80	0.50	20.00	64.00	0.00
0	1.90	1.80	9.00	5.00	0.90	1.00	20.00	64.00	1.00

PT KNOLL 3 MAY 79

1	0.20	0.10	15.00	3.00	0.30	0.50	16.00	52.00	2.00
1	2.20	0.60	15.00	3.00	0.30	0.50	16.00	55.00	0.00
1	0.30	0.80	15.00	3.00	0.30	0.50	16.00	57.00	0.00
1	1.20	1.30	14.00	3.00	0.50	0.50	16.00	58.00	1.00
1	0.20	1.40	13.00	4.00	0.60	0.50	16.00	61.00	1.00
1	0.00	1.80	10.00	4.00	0.80	0.50	16.00	63.00	2.00
1	0.50	2.20	10.00	4.00	0.80	0.50	16.00	64.00	0.00
0	3.50	2.60	8.00	5.00	1.00	1.00	16.00	63.00	1.00
1	1.00	2.80	8.00	5.00	1.00	1.00	16.00	63.00	2.00

PT JACKSON 3 MAY 79

1	1.80	0.00	15.00	3.00	0.30	0.50	16.00	51.00	0.00
1	0.70	0.30	15.00	3.00	0.30	0.50	16.00	53.00	2.00
0	3.30	0.40	15.00	3.00	0.30	0.50	16.00	55.00	0.00
1	2.20	0.60	15.00	3.00	0.30	0.50	16.00	56.00	0.00
1	1.40	1.00	15.00	3.00	0.30	0.50	16.00	59.00	1.00
1	0.30	1.10	15.00	3.00	0.30	0.50	16.00	60.00	1.00
1	0.80	1.40	10.00	4.00	0.80	0.50	16.00	62.00	2.00
0	3.30	1.60	10.00	4.00	0.80	0.50	16.00	63.00	0.00
0	1.50	2.60	10.00	4.00	0.80	0.50	16.00	63.00	1.00
1	1.80	2.00	10.00	4.00	0.80	0.50	16.00	62.00	0.00

PT KNOLL 7 MAY 79

1	3.70	0.10	15.00	2.50	0.70	0.00	16.00	56.00	1.00
1	0.40	0.10	15.00	2.50	0.70	0.00	16.00	56.00	-1.00
0	5.30	0.30	15.00	2.50	0.60	0.00	16.00	57.00	-1.00
1	1.80	0.50	15.00	2.50	0.50	0.00	16.00	58.00	1.00
1	1.50	0.90	15.00	4.50	0.20	0.00	16.00	64.00	-1.00
0	4.30	1.30	15.00	4.50	0.20	0.00	16.00	64.00	-1.00
1	0.80	1.40	15.00	4.50	0.20	0.00	16.00	64.00	1.00
1	2.00	1.60	15.00	4.50	0.10	0.00	16.00	66.00	-1.00
0	5.30	1.90	15.00	4.50	0.10	0.00	16.00	66.00	-1.00
1	3.80	2.00	15.00	4.50	0.10	0.00	16.00	66.00	1.00
1	1.90	2.00	15.00	4.50	0.10	0.00	16.00	66.00	-1.00
0	5.60	2.20	15.00	6.00	0.00	0.00	16.00	66.00	1.00
1	1.90	2.20	15.00	6.00	0.00	0.00	16.00	66.00	-1.00
0	2.10	2.40	15.00	6.00	0.00	0.00	16.00	65.00	1.00
1	0.70	2.50	15.00	6.00	0.00	0.00	16.00	64.00	1.00

PT TURNER 7 MAY 79

0	2.20	0.00	15.00	1.00	0.50	0.00	17.00	45.00	1.00
0	1.40	0.30	15.00	1.00	0.50	0.00	17.00	48.00	-1.00
0	4.30	0.40	15.00	1.00	0.50	0.00	17.00	48.00	-1.00
1	0.40	0.40	15.00	1.00	0.60	0.00	17.00	49.00	1.00
1	0.30	0.90	15.00	2.50	0.70	0.00	17.00	53.00	-1.00
1	5.30	0.90	15.00	2.50	0.70	0.00	17.00	54.00	1.00
1	1.70	1.00	15.00	2.50	0.70	0.00	17.00	54.00	-1.00
1	1.40	1.70	15.00	3.00	0.40	0.00	17.00	61.00	-1.00
0	4.80	1.90	15.00	3.00	0.40	0.00	17.00	62.00	1.00
0	4.50	1.90	15.00	4.00	0.30	0.00	17.00	62.00	1.00
1	1.30	1.90	15.00	4.00	0.30	0.00	17.00	62.00	-1.00
0	6.10	2.10	15.00	4.50	0.20	0.00	17.00	63.00	-1.00
1	1.10	2.50	15.00	4.50	0.20	0.00	17.00	65.00	1.00

41342 7 MAY 79

1	0.40	0.10	15.00	1.00	0.50	0.00	9.00	49.00	1.00
1	1.10	0.70	15.00	3.00	0.60	0.00	9.00	56.00	-1.00
1	1.10	1.40	15.00	4.00	0.40	0.00	9.00	61.00	-1.00
1	0.70	2.10	15.00	4.50	0.20	0.00	9.00	65.00	1.00
0	0.60	2.80	15.00	6.00	0.00	0.00	9.00	65.00	-1.00
1	0.30	3.40	15.00	6.00	0.00	0.50	9.00	63.00	1.00
1	1.20	4.30	15.00	7.50	0.00	0.50	9.00	57.00	-1.00

41342 7 MAY 79

1	1.20	0.00	15.00	4.00	0.60	0.00	23.00	59.00	1.00
1	0.70	0.10	15.00	4.00	0.50	0.00	23.00	60.00	-1.00
1	0.40	0.40	15.00	4.00	0.40	0.00	23.00	62.00	1.00
1	0.30	0.70	15.00	4.50	0.20	0.00	23.00	64.00	-1.00
1	0.80	1.00	15.00	5.00	0.20	0.00	23.00	65.00	1.00
0	1.60	1.20	15.00	5.00	0.20	0.00	23.00	66.00	-1.00
1	0.60	1.60	15.00	5.00	0.20	0.00	23.00	66.00	1.00

HC130 8 MAY 79

1	1.30	0.00	15.00	5.50	0.00	0.50	180.00	1000.00	56.00	2.00
1	0.90	0.10	15.00	5.50	0.00	0.50	180.00	1000.00	57.00	1.00
1	1.30	0.20	15.00	5.50	0.00	0.50	180.00	1000.00	57.00	0.00
1	1.00	0.40	15.00	8.50	0.00	0.50	180.00	500.00	61.00	0.00
1	0.20	0.50	15.00	7.00	0.00	0.50	180.00	500.00	62.00	1.00
1	1.20	0.50	15.00	6.00	0.00	0.50	180.00	500.00	63.00	2.00
1	0.90	0.60	15.00	4.50	0.00	0.50	180.00	1000.00	59.00	0.00
1	1.10	0.70	15.00	6.00	0.00	0.50	180.00	1000.00	58.00	1.00
1	0.20	0.90	15.00	8.00	0.00	0.50	180.00	1000.00	58.00	2.00
1	0.90	1.00	15.00	11.00	0.00	1.00	180.00	500.00	54.00	2.00
0	2.20	1.10	15.00	11.00	0.00	1.00	180.00	500.00	55.00	0.00
1	1.00	1.20	15.00	11.00	0.00	1.00	180.00	500.00	55.00	1.00

HH52 8 MAY 79

1	1.00	0.10	15.00	8.50	0.00	0.50	90.00	1000.00	62.00	2.00
0	2.10	0.10	15.00	8.50	0.00	0.50	90.00	1000.00	62.00	1.00
0	2.20	0.20	15.00	8.50	0.00	0.50	90.00	1000.00	63.00	1.00
0	2.90	0.20	15.00	8.50	0.00	0.50	90.00	1000.00	63.00	1.00
1	0.80	0.30	15.00	8.50	0.00	0.50	90.00	1000.00	64.00	0.00
0	2.70	1.00	15.00	11.00	0.00	1.00	90.00	1000.00	55.00	0.00
0	2.80	1.30	15.00	11.00	0.00	1.00	90.00	1000.00	52.00	2.00
1	2.20	1.50	15.00	11.00	0.00	1.00	90.00	1000.00	50.00	2.00
1	0.70	0.60	15.00	5.50	0.00	0.50	90.00	500.00	65.00	1.00
1	0.10	0.90	15.00	5.50	0.00	0.50	90.00	500.00	60.00	0.00
1	0.50	1.00	15.00	5.50	0.00	0.50	90.00	500.00	66.00	2.00
0	2.80	1.60	15.00	9.00	0.00	1.00	90.00	500.00	48.00	0.00
0	3.20	1.70	15.00	9.00	0.00	1.00	90.00	500.00	47.00	1.00
1	1.00	1.70	15.00	9.00	0.00	1.00	90.00	500.00	47.00	1.00
0	1.60	1.90	15.00	9.00	0.00	1.00	90.00	500.00	45.00	2.00

HH3F 8 MAY 79

1	1.10	0.00	15.00	5.00	0.00	0.50	90.00	1000.00	51.00	2.00
0	2.30	0.20	15.00	5.00	0.00	0.50	90.00	1000.00	52.00	1.00
1	1.20	0.20	15.00	5.00	0.00	0.50	90.00	1000.00	53.00	1.00
1	0.60	0.30	15.00	5.00	0.00	0.50	90.00	1000.00	54.00	0.00
1	0.00	0.90	15.00	5.00	0.00	0.50	90.00	1000.00	65.00	2.00
1	0.10	1.00	15.00	5.00	0.00	0.50	90.00	1000.00	64.00	1.00
0	1.20	1.00	15.00	5.00	0.00	0.50	90.00	1000.00	64.00	1.00
0	2.40	1.10	15.00	5.00	0.00	0.50	90.00	1000.00	64.00	0.00
0	1.40	1.20	15.00	5.00	0.00	0.50	90.00	1000.00	63.00	2.00
0	1.90	0.50	15.00	5.50	0.00	0.50	90.00	500.00	56.00	1.00
0	1.70	0.60	15.00	6.00	0.00	0.50	90.00	500.00	57.00	1.00
1	0.40	0.80	15.00	6.00	0.00	0.50	90.00	500.00	59.00	2.00
1	0.30	0.80	15.00	6.00	0.00	0.50	90.00	500.00	59.00	0.00
1	1.80	1.30	15.00	4.50	0.00	0.50	90.00	500.00	62.00	1.00
0	1.80	1.40	15.00	6.00	0.00	0.50	90.00	500.00	62.00	1.00
1	1.80	1.50	15.00	7.00	0.00	0.50	90.00	500.00	62.00	2.00
1	0.90	1.70	15.00	9.00	0.00	0.50	90.00	500.00	61.00	0.00

HU16 9 MAY 79

1	0.40	0.10	7.00	7.50	0.00	1.00	150.00	1000.00	62.00	0.00
1	1.10	0.20	7.00	7.50	0.00	1.00	150.00	1000.00	62.00	1.00
1	0.50	0.70	6.00	7.00	0.10	1.00	150.00	500.00	66.00	2.00
1	0.20	0.80	6.00	7.00	0.10	1.00	150.00	500.00	66.00	1.00
1	1.20	0.90	6.00	7.00	0.10	1.00	150.00	500.00	66.00	0.00

HH52 9 MAY 79

1	0.70	0.30	6.00	7.00	0.10	1.00	90.00	1000.00	66.00	2.00
1	0.40	1.20	8.00	13.50	0.20	2.00	90.00	1000.00	52.00	1.00
1	0.80	1.30	8.00	13.50	0.20	2.00	90.00	1000.00	51.00	0.00
1	0.10	1.30	8.00	13.50	0.20	2.00	90.00	1000.00	50.00	2.00
0	1.00	1.30	8.00	13.50	0.20	2.00	90.00	1000.00	50.00	2.00
0	1.00	0.70	6.00	10.00	0.10	1.00	90.00	500.00	65.00	1.00
1	0.20	0.80	6.00	10.00	0.10	1.00	90.00	500.00	65.00	2.00
1	0.20	0.90	6.00	10.00	0.10	1.00	90.00	500.00	64.00	0.00
1	0.20	1.90	7.00	18.00	0.20	2.00	90.00	500.00	43.00	2.00
0	0.70	1.80	7.00	18.00	0.20	2.00	90.00	500.00	44.00	0.00
1	0.60	2.00	8.00	19.00	0.20	3.00	90.00	500.00	42.00	1.00

PT. TURNER 10 MAY 79

1	0.20	0.90	6.00	7.50	0.50	1.00	16.00	59.00	-1.00
1	1.30	1.20	6.00	7.50	0.50	1.00	16.00	62.00	-1.00
0	1.20	1.50	6.00	7.50	0.50	1.00	16.00	64.00	1.00
0	2.00	0.80	6.00	7.50	0.50	1.00	16.00	58.00	1.00
1	0.90	1.90	6.00	6.50	0.50	1.00	16.00	66.00	1.00
0	1.40	2.20	6.00	6.50	0.50	1.00	16.00	67.00	-1.00
1	0.60	2.30	6.00	6.50	0.50	1.00	15.00	68.00	-1.00
0	1.50	2.60	6.00	6.50	0.50	1.00	15.00	68.00	-1.00
1	1.00	3.20	6.00	5.00	0.60	1.00	15.00	66.00	1.00
1	0.70	3.70	6.00	5.00	0.60	1.00	15.00	63.00	1.00
1	0.60	3.80	6.00	5.00	0.60	1.00	15.00	62.00	-1.00
1	1.30	3.20	6.00	5.00	0.60	1.00	15.00	66.00	-1.00

41537 10 MAY 79

1	0.40	1.30	6.00	7.50	0.30	0.50	20.00	63.00	1.00
0	0.70	0.00	6.00	5.50	0.30	0.50	20.00	51.00	-1.00
0	1.20	0.30	6.00	5.50	0.30	0.50	20.00	54.00	-1.00
0	1.20	0.90	6.00	6.50	0.30	0.50	20.00	59.00	-1.00
0	1.10	0.90	6.00	6.50	0.30	0.50	20.00	60.00	1.00
0	1.40	3.00	6.00	5.00	0.60	1.00	20.00	65.00	-1.00
1	0.10	3.10	6.00	5.00	0.60	1.00	20.00	65.00	1.00
1	1.00	3.80	6.00	8.00	0.50	1.00	20.00	60.00	-1.00
0	1.20	3.20	6.00	5.00	0.60	1.00	20.00	64.00	-1.00
0	0.90	3.50	6.00	5.00	0.60	1.00	20.00	62.00	-1.00
0	1.60	3.30	6.00	5.00	0.60	1.00	20.00	63.00	1.00

41441 10 MAY 79

1	0.20	1.20	6.00	7.50	0.50	1.00	20.00	65.00	-1.00
1	0.50	1.50	6.00	7.50	0.50	1.00	20.00	66.00	1.00
1	0.70	1.70	6.00	6.50	0.50	1.00	23.00	67.00	-1.00
1	0.40	2.50	6.00	5.00	0.60	1.00	23.00	62.00	1.00
1	0.10	2.80	6.00	5.00	0.60	1.00	23.00	61.00	-1.00
0	1.20	2.60	6.00	5.00	0.60	1.00	23.00	62.00	-1.00

CAPE FAIRWEATHER 10 MAY 79

1	0.50	1.20	6.00	7.50	0.50	1.00	11.00	63.00	1.00
1	0.60	2.10	6.00	6.50	0.50	1.00	11.00	67.00	-1.00
0	1.80	3.70	6.00	6.00	0.60	1.00	11.00	61.00	1.00
1	0.10	3.70	6.00	6.00	0.60	1.00	11.00	61.00	-1.00
1	0.60	4.90	7.00	8.50	0.50	1.00	11.00	50.00	-1.00
0	1.00	4.60	7.00	13.00	0.50	1.00	11.00	53.00	1.00
1	1.20	5.10	7.00	8.00	0.50	1.00	11.00	48.00	1.00
0	1.00	4.10	7.00	13.00	0.50	1.00	11.00	58.00	1.00
0	1.80	4.30	7.00	13.00	0.50	1.00	11.00	56.00	-1.00
0	0.70	4.80	7.00	10.00	0.50	1.00	11.00	52.00	-1.00
0	1.10	5.60	7.00	7.50	0.50	1.00	11.00	42.00	-1.00

HH52 16 MAY 79

1	0.10	0.10	1.00	5.00	0.80	3.00	85.00	1000.00	65.00	2.00
0	2.40	0.40	1.00	5.00	0.80	3.00	85.00	1000.00	66.00	0.00
0	2.00	0.20	1.00	5.00	0.80	3.00	85.00	1000.00	65.00	2.00
1	0.20	1.30	10.00	5.50	0.50	1.00	85.00	1000.00	61.00	2.00
0	2.30	1.40	10.00	5.50	0.50	1.00	85.00	1000.00	61.00	0.00
1	0.50	1.50	10.00	5.50	0.50	1.00	85.00	1000.00	60.00	0.00
0	2.60	1.50	10.00	5.50	0.50	1.00	85.00	1000.00	60.00	2.00
0	2.80	1.70	10.00	5.50	0.50	1.00	85.00	1000.00	59.00	0.00
1	2.50	1.80	10.00	5.50	0.50	1.00	85.00	1000.00	59.00	1.00
0	3.30	0.90	3.00	5.00	0.80	3.00	85.00	500.00	68.00	0.00
0	1.10	1.00	3.00	5.00	0.80	3.00	85.00	500.00	68.00	0.00
0	2.10	1.00	3.00	5.00	0.80	3.00	85.00	500.00	68.00	0.00
1	1.10	1.00	3.00	5.00	0.80	3.00	85.00	500.00	68.00	2.00
0	1.30	1.10	4.00	5.00	0.80	3.00	85.00	500.00	63.00	0.00
1	1.70	1.20	4.00	5.00	0.80	3.00	85.00	500.00	67.00	2.00
0	3.20	1.20	4.00	5.00	0.80	3.00	85.00	500.00	67.00	0.00
0	2.90	2.20	14.00	6.00	0.50	1.00	85.00	500.00	53.00	2.00
1	0.10	2.20	14.00	6.00	0.50	1.00	85.00	500.00	53.00	2.00
1	1.40	2.30	14.00	6.00	0.50	1.00	85.00	500.00	52.00	0.00
0	3.60	2.40	14.00	6.00	0.50	1.00	85.00	500.00	51.00	0.00
0	3.70	2.40	14.00	6.00	0.50	1.00	85.00	500.00	51.00	1.00
0	3.10	2.30	14.00	6.00	0.50	1.00	85.00	500.00	52.00	2.00

HC130 16 MAY 79

0	1.70	0.10	5.00	6.00	0.70	3.00	180.00	1000.00	67.00	2.00
1	0.20	0.10	5.00	6.00	0.70	3.00	180.00	1000.00	67.00	2.00
0	1.90	0.20	5.00	6.00	0.70	3.00	180.00	1000.00	67.00	0.00
0	0.00	0.30	6.00	6.00	0.70	2.50	180.00	1000.00	66.00	0.00
0	2.10	0.30	6.00	6.00	0.70	2.50	180.00	1000.00	66.00	2.00
1	0.20	0.30	6.00	6.00	0.70	2.50	180.00	1000.00	66.00	1.00
0	2.00	0.40	6.00	6.00	0.70	2.50	180.00	1000.00	65.00	0.00
0	2.10	0.50	7.50	6.00	0.60	2.00	180.00	1000.00	64.00	1.00
0	2.20	0.50	8.00	5.50	0.60	1.50	180.00	500.00	64.00	1.00
0	2.00	0.70	8.00	5.50	0.60	1.50	180.00	500.00	63.00	0.00
1	0.10	0.70	8.00	5.50	0.60	1.50	180.00	500.00	63.00	1.00
0	0.20	0.70	9.00	5.50	0.60	1.50	180.00	500.00	63.00	1.00
1	0.20	0.70	9.00	5.50	0.60	1.50	180.00	500.00	62.00	0.00
0	1.80	0.80	10.00	5.50	0.50	1.00	180.00	500.00	61.00	2.00
0	1.70	0.90	10.00	5.50	0.50	1.00	180.00	500.00	61.00	0.00
1	0.10	1.00	10.00	5.50	0.50	1.00	180.00	500.00	61.00	2.00

CAPE FAIRWEATHER 17 MAY 79

0	1.80	0.20	15.00	13.00	0.80	2.00	11.00	56.00	1.00
1	1.10	0.50	15.00	13.00	0.80	2.00	11.00	55.00	-1.00
0	1.90	0.50	15.00	13.00	0.80	2.00	11.00	53.00	1.00
0	2.10	0.70	15.00	13.00	0.80	2.00	11.00	51.00	1.00
0	2.00	0.80	15.00	13.00	0.80	2.00	11.00	49.00	1.00
1	1.80	1.60	15.00	9.00	0.50	1.50	11.00	40.00	1.00
1	0.50	1.80	15.00	9.00	0.50	1.50	11.00	39.00	1.00

PT. JACKSON 17 MAY 79

1	0.70	0.00	15.00	12.00	0.95	2.00	17.00	61.00	-1.00
1	2.30	0.10	15.00	12.00	0.95	2.00	17.00	60.00	1.00
1	0.90	0.20	15.00	12.00	0.90	2.00	17.00	59.00	1.00
0	3.10	0.90	15.00	13.00	0.85	2.00	17.00	53.00	1.00
0	1.70	1.20	15.00	12.00	0.80	2.00	17.00	50.00	1.00
0	1.10	1.30	15.00	11.00	0.75	2.00	17.00	49.00	-1.00
1	2.00	1.40	15.00	11.00	0.65	2.00	16.00	48.00	1.00
1	1.80	1.60	15.00	10.00	0.60	2.00	16.00	44.00	-1.00
0	2.20	1.80	15.00	10.00	0.55	2.00	16.00	42.00	1.00
0	2.00	1.90	15.00	9.00	0.50	1.50	16.00	41.00	1.00
1	1.20	2.20	15.00	9.00	0.50	1.50	16.00	39.00	1.00
0	5.20	2.30	15.00	9.00	0.50	1.50	16.00	38.00	1.00

41413 17 MAY 79

0	0.90	0.90	15.00	13.00	0.80	2.00	20.00	53.00	1.00
0	0.60	1.10	15.00	12.00	0.80	2.00	20.00	52.00	-1.00
0	1.00	1.30	15.00	11.00	0.70	2.00	20.00	50.00	1.00
0	1.70	1.80	15.00	10.00	0.60	1.50	20.00	44.00	1.00
0	1.60	2.10	15.00	10.00	0.60	1.50	20.00	41.00	1.00
0	2.20	2.20	15.00	9.00	0.50	1.50	20.00	39.00	1.00
0	2.20	2.30	15.00	9.00	0.50	1.50	20.00	39.00	1.00
1	0.20	2.50	15.00	9.00	0.50	1.50	20.00	37.00	-1.00
0	1.90	2.70	15.00	9.00	0.50	1.50	20.00	33.00	1.00

41441 17 MAY 79

0	1.80	0.10	15.00	11.50	0.95	2.00	18.00	59.00	1.00
0	1.00	0.40	15.00	12.00	0.90	2.00	18.00	56.00	-1.00
0	2.00	0.40	15.00	12.00	0.90	2.00	18.00	56.00	1.00
0	1.50	0.60	15.00	13.00	0.85	2.00	18.00	55.00	1.00
0	2.20	0.70	15.00	11.00	0.80	2.00	18.00	52.00	1.00
0	0.70	1.10	15.00	10.00	0.70	2.00	18.00	50.00	1.00
0	1.50	1.60	15.00	10.00	0.60	2.00	20.00	42.00	1.00
0	0.90	1.90	15.00	9.00	0.50	1.50	20.00	39.00	-1.00
0	2.20	1.90	15.00	9.00	0.50	1.50	20.00	39.00	1.00
0	1.20	2.10	15.00	9.00	0.50	1.50	20.00	37.00	1.00
1	1.50	2.20	15.00	9.00	0.50	1.50	20.00	36.00	-1.00
0	1.70	2.50	15.00	9.00	0.50	1.50	20.00	35.00	1.00
0	1.10	2.50	15.00	9.00	0.50	1.50	20.00	32.00	1.00

CAPE FAIRWEATHER 18 MAY 79

1	0.00	1.00	3.00	12.00	1.00	3.00	11.00	62.00	1.00
1	0.40	1.80	3.00	13.00	1.00	3.00	11.00	67.00	-1.00
0	0.60	2.90	3.00	14.00	1.00	2.00	11.00	68.00	-1.00
1	0.40	3.00	3.00	14.00	1.00	2.00	11.00	68.00	-1.00
0	0.50	3.70	8.00	13.00	0.90	2.00	11.00	62.00	1.00

PT JACKSON 18 MAY 79

1	0.70	0.60	2.00	12.00	1.00	3.00	14.00	57.00	1.00
0	1.30	0.90	3.00	12.00	1.00	3.00	14.00	59.00	1.00
0	1.30	1.00	3.00	12.00	1.00	3.00	14.00	60.00	-1.00
0	0.60	1.50	3.00	12.00	1.00	2.50	14.00	63.00	-1.00
1	0.10	2.90	3.00	14.00	1.00	2.00	14.00	69.00	-1.00
1	0.30	3.60	8.00	13.00	0.95	2.00	14.00	65.00	1.00

41585 18 MAY 79

1	0.20	0.50	3.00	12.00	1.00	3.00	20.00	59.00	-1.00
0	0.80	0.70	3.00	12.00	1.00	3.00	20.00	61.00	1.00
0	0.40	2.40	3.00	14.00	1.00	2.00	19.00	68.00	-1.00
0	1.00	2.60	3.00	14.00	1.00	2.00	19.00	68.00	1.00
1	0.50	3.10	5.00	14.00	1.00	2.00	19.00	66.00	1.00

HH3 22 MAY 79

1	1.20	0.10	15.00	8.00	1.00	0.50	96.00	1000.00	64.00	1.00
1	0.10	0.30	15.00	8.00	1.00	0.50	96.00	1000.00	63.00	2.00
0	0.40	0.40	15.00	8.00	1.00	0.50	96.00	1000.00	62.00	0.00
0	1.00	0.40	15.00	8.00	1.00	0.50	90.00	500.00	62.00	0.00
1	0.80	0.70	15.00	8.00	1.00	0.50	90.00	500.00	59.00	1.00
1	0.30	0.80	15.00	8.00	1.00	0.50	90.00	500.00	58.00	2.00

HH52 22 MAY 79

0	2.00	0.10	15.00	4.00	0.50	0.00	85.00	1000.00	65.00	1.00
1	1.50	0.40	15.00	6.00	0.90	0.00	85.00	1000.00	67.00	0.00
1	1.00	0.40	15.00	6.00	0.90	0.00	85.00	500.00	66.00	0.00
0	1.40	0.70	15.00	6.00	0.90	0.00	85.00	500.00	69.00	1.00
1	1.20	0.70	15.00	6.00	0.90	0.00	85.00	500.00	69.00	1.00

HC130 22 & 23 MAY 79

1	0.20	0.10	6.00	4.00	1.00	0.50	180.00	1000.00	55.00	2.00
0	0.90	0.00	15.00	3.00	0.30	0.00	180.00	1000.00	57.00	2.00
1	0.20	0.20	15.00	3.00	0.30	0.00	180.00	1000.00	59.00	1.00
1	1.20	0.30	15.00	3.00	0.30	0.00	180.00	1000.00	60.00	0.00
1	1.50	0.30	15.00	3.00	0.40	0.00	180.00	500.00	61.00	0.00
1	0.50	0.40	15.00	3.00	0.50	0.00	180.00	500.00	62.00	1.00
1	0.50	0.60	15.00	4.00	0.60	0.00	180.00	500.00	63.00	2.00
1	0.60	0.20	15.00	7.00	1.00	0.50	180.00	1000.00	66.00	2.00
1	1.20	0.30	15.00	7.00	1.00	0.50	180.00	1000.00	65.00	0.00
1	1.50	0.50	15.00	8.00	1.00	0.50	180.00	500.00	64.00	0.00
1	0.60	0.50	15.00	8.00	1.00	0.50	180.00	500.00	64.00	2.00
0	1.20	0.60	15.00	8.00	1.00	0.50	180.00	500.00	63.00	1.00
0	1.60	0.70	15.00	8.00	1.00	0.50	180.00	500.00	62.00	1.00

41342 17 SEPT 79

1	1.50	1.70	18.00	10.00	0.00	1.00	21.00	49.00	2.00
1	0.10	2.60	17.00	11.00	0.00	1.00	21.00	48.00	2.00
0	1.10	0.90	16.00	8.00	0.00	1.00	21.00	47.00	0.00
0	0.50	2.90	17.00	11.00	0.00	1.00	21.00	47.00	0.00
1	0.40	4.20	15.00	9.00	0.00	1.00	21.00	38.00	0.00
1	0.50	4.50	15.00	9.00	0.00	1.00	21.00	36.00	0.00
1	1.00	5.20	15.00	9.00	0.00	1.00	21.00	29.00	2.00
0	1.20	4.80	15.00	9.00	0.00	1.00	21.00	34.00	0.00
0	1.60	3.90	15.00	10.00	0.00	1.00	21.00	41.00	0.00
0	0.60	4.90	15.00	9.00	0.00	1.00	21.00	34.00	0.00

PT WELLS 17 SEPT 79

1	0.60	0.10	13.00	5.00	0.00	1.00	15.00	46.00	2.00
1	3.50	1.10	17.00	9.00	0.00	1.00	15.00	49.00	2.00
1	2.80	1.30	17.00	9.00	0.00	1.00	15.00	49.00	0.00
1	0.40	1.70	17.00	9.00	0.00	1.00	15.00	49.00	0.00
1	0.10	2.00	18.00	11.00	0.00	1.00	15.00	48.00	0.00
1	2.60	3.10	15.00	10.00	0.00	1.00	15.00	43.00	2.00
0	3.80	2.20	18.00	11.00	0.00	1.00	15.00	47.00	0.00
0	3.20	2.80	18.00	11.00	0.00	1.00	15.00	44.00	0.00
0	2.70	3.20	15.00	10.00	0.00	1.00	15.00	42.00	0.00
0	2.10	3.80	15.00	10.00	0.00	1.00	15.00	37.00	0.00
0	4.90	1.70	17.00	9.00	0.00	1.00	15.00	49.00	0.00
0	0.60	2.70	18.00	11.00	0.00	1.00	15.00	45.00	0.00
0	1.70	4.10	15.00	10.00	0.00	1.00	15.00	35.00	0.00
1	0.60	6.60	12.00	16.00	0.00	1.50	15.00	9.00	0.00
1	0.10	6.10	12.00	16.00	0.00	1.50	15.00	16.00	2.00
0	3.10	4.50	15.00	9.00	0.00	1.00	15.00	32.00	0.00
0	2.20	5.10	15.00	9.00	0.00	1.00	15.00	26.00	2.00
0	0.80	5.50	15.00	9.00	0.00	1.00	15.00	21.00	0.00
0	4.40	5.50	15.00	9.00	0.00	1.00	15.00	21.00	0.00
0	2.20	5.80	15.00	9.00	0.00	1.00	15.00	19.00	0.00
0	4.50	6.50	12.00	16.00	0.00	1.50	15.00	9.00	0.00
0	1.80	7.00	12.00	16.00	0.00	1.50	15.00	6.00	2.00

44321 17 SEPT 79

1	0.20	1.40	17.00	9.00	0.00	1.00	9.50	47.00	0.00
1	1.10	2.20	18.00	10.00	0.00	1.00	9.50	49.00	2.00
1	0.20	4.40	15.00	9.00	0.00	1.00	9.50	39.00	0.00
1	0.20	4.80	15.00	9.00	0.00	1.00	9.50	16.00	0.00
0	1.00	5.80	15.00	9.00	0.00	1.00	9.50	26.00	2.00

CAPE GEORGE 17 SEPT 79

1	3.90	1.70	13.00	5.00	0.00	1.00	15.00	46.00	2.00
1	0.40	2.20	17.00	9.00	0.00	1.00	15.00	48.00	0.00
1	1.30	3.20	17.00	9.00	0.00	1.00	15.00	49.00	2.00
1	0.20	4.00	18.00	11.00	0.00	1.00	15.00	47.00	0.00
1	0.30	4.20	18.00	11.00	0.00	1.00	15.00	46.00	2.00
0	4.20	0.40	11.00	5.00	0.00	1.00	15.00	35.00	0.00
0	1.10	2.00	17.00	9.00	0.00	1.00	15.00	47.00	0.00
0	5.70	2.50	17.00	9.00	0.00	1.00	15.00	48.00	0.00
0	2.70	2.70	17.00	9.00	0.00	1.00	15.00	49.00	2.00
0	1.90	3.00	17.00	9.00	0.00	1.00	15.00	49.00	0.00
0	3.20	3.00	17.00	9.00	0.00	1.00	15.00	49.00	0.00
0	3.40	2.70	17.00	9.00	0.00	1.00	15.00	49.00	0.00
0	5.60	2.40	17.00	9.00	0.00	1.00	15.00	48.00	2.00
0	4.90	4.00	18.00	11.00	0.00	1.00	15.00	47.00	0.00
1	3.50	5.70	15.00	9.00	0.00	1.00	15.00	35.00	2.00
1	0.60	5.90	15.00	9.00	0.00	1.00	15.00	33.00	0.00
1	0.90	7.20	15.00	9.00	0.00	1.00	15.00	19.00	2.00
0	3.50	5.80	15.00	9.00	0.00	1.00	15.00	33.00	2.00
0	2.10	4.90	15.00	10.00	0.00	1.00	15.00	40.00	0.00
0	1.80	5.20	15.00	10.00	0.00	1.00	15.00	39.00	0.00
0	1.60	5.40	15.00	10.00	0.00	1.00	15.00	37.00	0.00
0	2.20	5.50	15.00	10.00	0.00	1.00	15.00	36.00	0.00
0	4.50	5.90	15.00	9.00	0.00	1.00	15.00	32.00	0.00
0	2.00	6.40	15.00	9.00	0.00	1.00	15.00	27.00	0.00
0	4.60	6.20	15.00	9.00	0.00	1.00	15.00	30.00	2.00

C150 18 SEPT 79

1	1.90	0.00	10.00	15.00	0.00	1.00	180.00	1000.00	38.00	2.00
1	1.50	0.10	10.00	15.00	0.00	1.00	180.00	1000.00	39.00	2.00
0	1.60	0.20	10.00	15.00	0.00	1.00	180.00	1000.00	39.00	0.00
0	1.20	0.20	10.00	15.00	0.00	1.00	180.00	1000.00	39.00	0.00
1	1.10	0.40	10.00	9.00	0.00	1.00	180.00	500.00	45.00	0.00
1	1.90	0.50	10.00	9.00	0.00	1.00	180.00	500.00	45.00	2.00
0	2.00	0.40	10.00	9.00	0.00	1.00	180.00	500.00	45.00	0.00
0	2.20	0.60	10.00	9.00	0.00	1.00	180.00	500.00	46.00	2.00
1	0.50	0.80	10.00	15.00	0.90	1.00	180.00	1000.00	48.00	2.00
0	1.30	0.80	10.00	5.00	0.50	1.00	180.00	1000.00	48.00	2.00
0	2.10	0.70	10.00	5.00	0.90	1.00	180.00	1000.00	48.00	0.00
0	0.90	0.90	10.00	15.00	0.90	1.00	180.00	1000.00	47.00	0.00
0	2.10	1.10	10.00	15.00	0.90	1.00	180.00	500.00	46.00	0.00
1	0.50	1.00	10.00	15.00	0.90	1.00	180.00	500.00	46.00	2.00
0	2.70	1.20	10.00	15.00	0.90	1.00	180.00	500.00	45.00	2.00
0	0.90	0.90	10.00	15.00	0.90	1.00	180.00	500.00	46.00	0.00
0	1.80	0.10	10.00	15.00	0.00	1.00	180.00	1000.00	39.00	2.00

HH52A 18 SEPT 79

1	0.10	0.00	10.00	9.00	0.00	1.00	90.00	1000.00	46.00	2.00
1	1.00	0.20	10.00	9.00	0.00	1.00	90.00	1000.00	47.00	2.00
0	0.70	0.40	10.00	9.00	0.00	1.00	90.00	1000.00	47.00	0.00
1	0.70	0.80	10.00	5.00	0.50	1.00	90.00	700.00	49.00	2.00
0	0.70	0.90	10.00	5.00	0.50	1.00	90.00	700.00	49.00	0.00
1	0.10	1.50	10.00	11.00	0.90	1.00	90.00	1000.00	44.00	2.00
1	0.20	1.20	10.00	5.00	0.50	1.00	90.00	500.00	49.00	0.00
0	5.30	1.00	10.00	5.00	0.50	1.00	90.00	500.00	49.00	0.00
1	0.00	2.00	9.00	11.00	0.90	1.00	90.00	1000.00	40.00	2.00
1	2.40	2.20	9.00	11.00	0.90	1.00	90.00	600.00	39.00	2.00
0	5.00	2.20	9.00	11.00	0.90	1.00	90.00	600.00	39.00	0.00
0	0.20	2.30	9.00	11.00	0.90	1.00	90.00	600.00	38.00	0.00
0	5.70	1.40	9.00	11.00	0.90	1.00	90.00	1000.00	44.00	2.00
0	2.40	0.30	10.00	9.00	0.50	1.00	90.00	1000.00	47.00	0.00
0	5.20	0.30	10.00	9.00	0.50	1.00	90.00	1000.00	47.00	0.00
0	5.40	0.60	10.00	5.00	0.50	1.00	90.00	1000.00	48.00	0.00
0	2.90	1.00	10.00	5.00	0.50	1.00	90.00	500.00	49.00	0.00
0	1.70	1.40	9.00	11.00	0.90	1.00	90.00	1000.00	44.00	0.00
0	1.70	1.70	9.00	11.00	0.90	1.00	90.00	1000.00	43.00	0.00

HH52A 19 SEPT 79

1	2.70	0.20	15.00	17.00	0.20	3.00	60.00	500.00	48.00	-1.00
0	1.30	0.40	15.00	17.00	0.20	3.00	60.00	500.00	49.00	1.00
1	1.90	1.30	15.00	14.00	0.10	3.00	90.00	500.00	48.00	-1.00
0	2.00	0.90	15.00	14.00	0.10	3.00	90.00	500.00	49.00	1.00
1	1.20	1.50	15.00	22.00	0.00	2.00	60.00	500.00	39.00	-1.00
0	1.30	1.90	15.00	21.00	0.00	4.00	60.00	500.00	36.00	1.00
0	0.70	2.50	15.00	21.00	0.00	4.00	90.00	500.00	30.00	-1.00

HC130 19 SEPT 79

1	0.40	0.10	15.00	18.00	0.10	2.00	165.00	1000.00	46.00	-1.00
1	2.20	0.20	15.00	18.00	0.10	2.00	165.00	1000.00	47.00	1.00
0	0.20	0.20	15.00	18.00	0.10	2.00	165.00	1000.00	47.00	1.00
0	2.50	0.20	15.00	18.00	0.10	2.00	165.00	1000.00	47.00	-1.00
0	3.20	1.50	15.00	22.00	0.00	2.00	200.00	1000.00	39.00	-1.00
1	2.50	1.10	15.00	17.00	0.20	3.00	150.00	1000.00	49.00	-1.00
1	0.50	1.30	15.00	17.00	0.20	3.00	150.00	1000.00	49.00	-1.00
0	2.20	1.00	15.00	17.00	0.20	3.00	150.00	1000.00	49.00	1.00
0	0.30	1.20	15.00	17.00	0.20	3.00	150.00	1000.00	49.00	1.00
0	1.70	1.30	15.00	17.00	0.20	3.00	150.00	1000.00	49.00	1.00
0	0.70	1.50	15.00	22.00	0.00	2.00	200.00	1000.00	39.00	1.00
1	0.70	1.30	15.00	22.00	0.00	2.00	200.00	1000.00	40.00	-1.00
1	1.30	1.50	15.00	22.00	0.00	2.00	200.00	1000.00	40.00	-1.00
0	0.80	1.50	15.00	22.00	0.00	2.00	200.00	1000.00	40.00	1.00
1	1.80	2.40	15.00	21.00	0.00	4.00	150.00	1000.00	30.00	-1.00
1	0.30	2.50	15.00	21.00	0.00	4.00	150.00	1000.00	29.00	-1.00
0	2.90	1.70	15.00	22.00	0.00	2.00	200.00	1000.00	38.00	1.00

PT WELLS 20 SEPT 79

1	0.20	0.00	15.00	1.00	0.00	1.00	15.00	39.00	1.00
1	0.90	4.10	15.00	11.00	0.00	1.00	15.00	41.00	-1.00
1	1.30	4.70	15.00	11.00	0.00	1.00	15.00	37.00	1.00
1	0.50	5.40	15.00	12.00	0.00	1.00	15.00	31.00	-1.00
1	0.60	6.00	15.00	13.00	0.00	1.00	15.00	26.00	-1.00
1	0.30	6.50	15.00	14.00	0.00	2.00	15.00	19.00	1.00
0	1.10	7.10	15.00	15.00	0.00	2.00	15.00	13.00	1.00
0	2.40	4.50	15.00	11.00	0.00	1.00	15.00	38.00	1.00
0	3.10	5.80	15.00	13.00	0.00	1.00	15.00	24.00	1.00

41413 20 SEPT 79

1	0.30	0.70	15.00	1.00	0.00	1.00	21.00	47.00	-1.00
1	0.40	1.50	15.00	5.00	0.00	1.00	21.00	49.00	-1.00
1	0.00	0.00	15.00	1.00	0.00	1.00	21.00	43.00	1.00
0	1.00	0.40	15.00	1.00	0.00	1.00	21.00	46.00	1.00
0	1.60	1.70	15.00	5.00	0.00	1.00	21.00	49.00	-1.00
0	1.60	1.10	15.00	3.00	0.00	1.00	21.00	48.00	1.00
1	0.60	3.30	15.00	11.00	0.00	1.00	21.00	43.00	-1.00
1	0.20	3.60	15.00	11.00	0.00	1.00	21.00	40.00	-1.00
1	0.20	4.00	15.00	12.00	0.00	1.00	21.00	36.00	1.00
0	1.00	2.90	15.00	7.00	0.00	1.00	21.00	45.00	-1.00
0	1.30	2.20	15.00	5.00	0.00	1.00	21.00	49.00	1.00

41441 20 SEPT 79

1	0.20	0.50	15.00	1.00	0.00	1.00	21.00	46.00	1.00
1	0.20	0.90	15.00	1.00	0.00	1.00	21.00	47.00	-1.00
0	0.90	2.40	15.00	5.00	0.00	1.00	21.00	49.00	1.00
1	0.70	1.80	15.00	5.00	0.00	1.00	21.00	49.00	1.00
0	1.40	1.50	15.00	5.00	0.00	1.00	21.00	48.00	-1.00
1	0.50	2.70	15.00	5.00	0.00	1.00	21.00	47.00	1.00
1	0.50	3.70	15.00	11.00	0.00	1.00	21.00	41.00	1.00
1	0.60	4.10	15.00	11.00	0.00	1.00	21.00	38.00	-1.00
1	0.70	4.40	15.00	11.00	0.00	1.00	21.00	36.00	-1.00
0	0.80	2.50	15.00	5.00	0.00	1.00	21.00	48.00	1.00

CAPE GEORGE 20 SEPT 79

1	0.20	1.80	15.00	3.00	0.00	1.00	15.00	48.00	-1.00
1	2.30	2.10	15.00	5.00	0.00	1.00	15.00	48.00	1.00
1	0.40	2.90	15.00	5.00	0.00	1.00	15.00	48.00	1.00
1	1.40	3.50	15.00	5.00	0.00	1.00	15.00	46.00	1.00
1	0.10	4.50	15.00	11.00	0.00	1.00	15.00	40.00	-1.00
1	1.00	5.10	15.00	12.00	0.00	1.00	15.00	35.00	1.00
1	0.20	5.60	15.00	12.00	0.00	1.00	15.00	31.00	-1.00
0	2.40	4.20	15.00	10.00	0.00	1.00	15.00	42.00	1.00
0	2.10	4.00	15.00	11.00	0.00	1.00	15.00	44.00	-1.00

PT KNOLL 24 SEPT 79

1	0.50	1.40	13.00	19.00	0.00	3.00	12.00	21.00	-1.00
1	0.20	2.60	13.00	18.00	0.10	3.00	16.00	29.00	-1.00
0	0.20	3.80	15.00	19.00	0.10	3.00	16.00	42.00	1.00
0	0.50	4.20	15.00	20.00	0.10	3.00	16.00	45.00	-1.00
0	0.90	4.10	15.00	19.00	0.10	3.00	16.00	44.00	-1.00
0	0.40	4.30	15.00	21.00	0.20	3.00	16.00	45.00	-1.00
1	0.20	6.80	15.00	18.00	0.20	3.50	12.00	43.00	1.00
1	0.80	8.90	15.00	17.00	0.20	3.50	12.00	26.00	-1.00
0	0.90	9.70	15.00	17.00	0.20	3.00	12.00	28.00	-1.00

41342 24 SEPT 79

0	0.60	3.10	15.00	19.00	0.20	4.00	17.00	31.00	1.00
0	0.30	3.20	15.00	18.00	0.20	4.00	17.00	30.00	1.00
0	0.80	4.20	15.00	17.00	0.20	3.00	17.00	19.00	-1.00
0	1.10	4.40	15.00	17.00	0.20	3.00	17.00	17.00	-1.00

44349 24 SEPT 79

0	0.80	1.60	13.00	18.00	0.10	3.00	11.00	35.00	-1.00

PT JACKSON 24 SEPT 79

1	0.10	0.10	13.00	18.00	0.10	3.00	16.00	28.00	-1.00
1	0.40	3.20	15.00	21.00	0.10	3.00	16.00	45.00	-1.00
0	0.60	3.20	15.00	21.00	0.10	3.00	16.00	45.00	-1.00
0	0.80	7.60	15.00	17.00	0.20	3.00	16.00	28.00	-1.00
0	1.20	6.30	15.00	18.00	0.20	3.50	16.00	46.00	-1.00
0	0.20	6.70	15.00	19.00	0.20	4.00	16.00	34.00	1.00

HG130 25 SEPT 79

0	0.70	0.10	15.00	8.00	1.00	2.00	200.00	1000.00	43.00	-1.00
1	0.00	0.20	15.00	8.00	1.00	2.00	200.00	1000.00	43.00	1.00
1	1.10	0.30	15.00	6.00	1.00	1.50	200.00	1000.00	42.00	-1.00
0	2.20	0.20	15.00	8.00	1.00	2.00	200.00	1000.00	43.00	1.00
0	1.70	0.40	15.00	5.00	1.00	1.50	200.00	1000.00	42.00	1.00
1	2.00	0.60	15.00	4.00	1.00	1.00	150.00	1000.00	39.00	1.00
1	0.00	0.80	15.00	5.00	1.00	1.00	150.00	1000.00	37.00	1.00
1	0.60	1.00	15.00	8.00	0.90	1.50	150.00	1000.00	36.00	-1.00
1	2.60	1.00	15.00	8.00	0.90	1.50	150.00	1000.00	36.00	-1.00
0	1.30	0.80	15.00	6.00	1.00	1.00	150.00	1000.00	37.00	-1.00
0	3.20	0.70	15.00	5.00	1.00	1.00	150.00	1000.00	37.00	-1.00
0	3.90	1.10	15.00	9.00	0.90	1.50	150.00	1000.00	35.00	1.00
0	3.90	0.60	15.00	4.00	1.00	1.00	150.00	1000.00	39.00	1.00
0	3.20	0.30	15.00	5.00	1.00	1.50	200.00	1000.00	42.00	-1.00
0	2.90	0.10	15.00	9.00	1.00	2.00	200.00	1000.00	43.00	-1.00
0	3.30	0.40	15.00	4.00	1.00	1.00	200.00	1000.00	42.00	1.00
0	1.20	1.10	15.00	7.00	0.80	1.00	200.00	1000.00	20.00	1.00
0	0.80	1.30	15.00	7.00	0.80	1.00	200.00	1000.00	20.00	-1.00
0	0.80	1.30	15.00	7.00	0.80	1.00	200.00	1000.00	17.00	1.00
0	2.60	1.30	15.00	7.00	0.80	1.00	200.00	1000.00	17.00	1.00
0	1.00	1.40	15.00	7.00	0.80	1.00	200.00	1000.00	16.00	-1.00
0	2.90	1.20	15.00	7.00	0.80	1.00	200.00	1000.00	18.00	-1.00
0	3.20	1.40	15.00	7.00	0.80	1.00	200.00	1000.00	15.00	-1.00
0	2.10	1.50	15.00	7.00	0.80	1.00	200.00	1000.00	15.00	-1.00
0	0.30	1.50	15.00	7.00	0.80	1.00	200.00	1000.00	15.00	-1.00
0	0.20	1.60	15.00	9.00	0.70	2.00	200.00	1000.00	12.00	-1.00
1	1.20	1.90	15.00	9.00	0.70	2.00	200.00	1000.00	8.00	1.00
0	1.70	1.70	15.00	9.00	0.70	2.00	200.00	1000.00	11.00	-1.00
0	3.60	1.80	15.00	9.00	0.70	2.00	200.00	1000.00	10.00	-1.00
0	3.40	1.80	15.00	9.00	0.70	2.00	200.00	1000.00	11.00	-1.00
0	1.30	1.80	15.00	9.00	0.70	2.00	200.00	1000.00	10.00	-1.00
0	0.70	2.00	15.00	9.00	0.70	2.00	200.00	1000.00	7.00	1.00
0	3.20	1.90	15.00	9.00	0.70	2.00	200.00	1000.00	10.00	1.00
0	2.60	0.90	15.00	5.00	1.00	1.00	150.00	1000.00	37.00	1.00

HH52A 25 SEPT 79

1	0.60	0.10	15.00	12.00	0.90	2.00	88.00	500.00	45.00	-1.00
1	1.10	0.30	15.00	12.00	0.90	2.00	88.00	500.00	44.00	1.00
0	2.80	0.20	15.00	12.00	0.90	2.00	88.00	500.00	45.00	-1.00
0	2.60	1.60	15.00	7.00	0.80	1.00	90.00	500.00	18.00	-1.00
1	0.00	0.60	15.00	4.00	1.00	1.00	60.00	500.00	42.00	1.00
1	0.10	1.20	15.00	4.00	1.00	1.00	60.00	500.00	38.00	-1.00
1	2.00	1.50	15.00	7.00	1.00	1.00	60.00	500.00	35.00	-1.00
0	2.40	0.90	15.00	4.00	1.00	1.00	60.00	500.00	40.00	1.00
1	0.30	1.60	15.00	7.00	0.80	1.00	90.00	500.00	18.00	-1.00
1	1.60	1.50	15.00	7.00	0.80	1.00	90.00	500.00	19.00	1.00
1	1.20	1.70	15.00	7.00	0.80	1.00	90.00	500.00	17.00	1.00
1	1.00	1.90	15.00	8.00	0.80	1.00	90.00	500.00	14.00	-1.00
0	1.50	1.80	15.00	8.00	0.80	1.00	90.00	500.00	16.00	-1.00
0	1.40	2.40	15.00	9.00	0.70	2.00	60.00	500.00	9.00	-1.00
1	1.00	2.10	15.00	9.00	0.70	2.00	60.00	500.00	12.00	1.00
1	1.20	2.70	15.00	9.00	0.70	2.00	60.00	500.00	6.00	-1.00
0	1.60	2.20	15.00	9.00	0.70	2.00	60.00	500.00	10.00	1.00
0	2.60	0.50	15.00	12.00	0.90	2.00	88.00	500.00	44.00	1.00

HH52A 26 SEPT 79

0	1.70	0.50	8.00	11.00	0.50	1.00	90.00	1000.00	14.00	2.00
1	0.70	0.60	8.00	11.00	0.60	1.00	90.00	500.00	17.00	2.00
0	2.50	0.90	8.00	9.00	0.60	1.00	90.00	500.00	21.00	0.00
1	0.70	1.50	10.00	12.00	0.50	1.00	90.00	1000.00	43.00	0.00
1	0.70	1.50	10.00	8.00	0.50	1.00	90.00	1000.00	45.00	2.00
0	1.40	1.40	10.00	8.00	0.50	1.00	90.00	1000.00	45.00	0.00
0	2.20	2.00	10.00	9.00	0.50	1.00	90.00	500.00	47.00	2.00
0	1.00	2.50	10.00	9.00	0.50	1.00	90.00	500.00	47.00	2.00
0	2.00	2.40	10.00	9.00	0.50	1.00	90.00	500.00	47.00	2.00

MM16E 26SEPT79

1	0.80	0.10	8.00	9.00	0.70	1.00	145.00	1000.00	25.00	0.00
1	0.60	0.60	9.00	8.00	0.60	1.00	145.00	1000.00	29.00	2.00
0	2.50	0.30	8.00	9.00	0.70	1.00	145.00	1000.00	28.00	2.00
1	1.10	1.20	9.00	10.00	0.60	1.00	145.00	500.00	35.00	0.00
0	2.50	0.90	9.00	8.00	0.60	1.00	145.00	500.00	33.00	2.00
0	1.20	1.00	9.00	9.00	0.60	1.00	145.00	500.00	34.00	0.00
0	2.00	1.20	10.00	11.00	0.50	1.00	145.00	500.00	35.00	0.00
1	0.30	1.70	10.00	10.00	0.50	1.00	145.00	1000.00	47.00	2.00
0	1.20	1.60	10.00	10.00	0.50	1.00	145.00	1000.00	47.00	0.00
0	2.10	1.30	10.00	10.00	0.50	1.00	145.00	1000.00	47.00	0.00
0	2.00	1.90	10.00	10.00	0.50	1.00	145.00	1000.00	48.00	2.00
1	1.70	2.00	10.00	9.00	0.50	1.00	145.00	500.00	48.00	2.00
1	0.60	2.10	10.00	9.00	0.50	1.00	145.00	500.00	48.00	2.00
0	0.90	2.30	10.00	9.00	0.50	1.00	145.00	500.00	47.00	0.00
0	2.20	1.50	9.00	8.00	0.30	1.00	145.00	500.00	46.00	0.00

44342 27 SEPT 79

1	0.60	0.10	15.00	7.50	0.10	0.00	10.00	26.00	0.00
1	0.10	1.10	15.00	5.50	0.20	0.00	10.00	16.00	0.00
0	2.10	2.10	15.00	5.00	0.10	0.00	10.00	4.00	0.00
0	2.50	2.90	15.00	1.00	0.10	0.00	10.00	-4.00	0.00

PT JACKSON 27 SEPT 79

1	0.50	0.50	15.00	7.50	0.10	0.00	15.00	23.00	0.00
1	0.80	1.00	15.00	6.50	0.20	0.00	15.00	17.00	2.00
1	0.60	1.50	15.00	5.50	0.20	0.00	15.00	13.00	2.00
1	2.20	1.80	15.00	5.00	0.20	0.00	15.00	9.00	2.00
1	3.10	1.80	15.00	5.00	0.20	0.00	15.00	9.00	2.00
1	0.30	2.50	15.00	5.00	0.10	0.00	15.00	2.00	0.00
1	0.30	2.70	15.00	6.00	0.10	0.00	12.00	-1.00	2.00
0	3.80	0.30	15.00	7.50	0.10	0.00	15.00	25.00	2.00
0	3.50	1.30	15.00	5.50	0.20	0.00	15.00	14.00	2.00
0	4.30	1.40	15.00	5.50	0.20	0.00	15.00	15.00	2.00
0	3.20	3.10	15.00	7.00	0.10	0.00	12.00	-5.00	2.00
0	3.00	2.20	15.00	5.00	0.10	0.00	15.00	3.00	0.00

HC-130 2 OCT 79

0	2.60	0.00	15.00	1.00	1.00	1.00	180.00	1000.00	41.00	0.00
0	1.50	0.10	15.00	1.00	1.00	1.00	180.00	1000.00	42.00	2.00
1	1.60	0.10	15.00	1.00	1.00	1.00	180.00	1000.00	42.00	2.00
1	0.30	0.20	15.00	1.00	1.00	1.00	180.00	1000.00	42.00	0.00
1	0.70	0.20	15.00	1.00	1.00	1.00	180.00	1000.00	43.00	2.00
0	3.20	0.30	15.00	1.00	1.00	1.00	180.00	1000.00	43.00	0.00
0	2.90	0.60	15.00	2.00	1.00	1.00	180.00	500.00	44.00	0.00
1	2.20	0.60	15.00	2.00	1.00	1.00	180.00	500.00	44.00	2.00
1	0.20	0.60	15.00	3.00	1.00	1.00	180.00	500.00	44.00	0.00
1	1.20	0.70	15.00	3.00	1.00	1.00	180.00	500.00	44.00	2.00
1	1.60	0.70	15.00	3.00	1.00	1.00	180.00	500.00	44.00	2.00
0	3.00	0.70	15.00	3.00	1.00	1.00	180.00	500.00	44.00	0.00
0	0.00	4.00	15.00	11.00	0.10	2.00	180.00	1000.00	21.00	2.00
0	3.00	3.90	15.00	11.00	0.10	2.00	180.00	1000.00	22.00	2.00
1	0.20	4.10	15.00	11.00	0.10	2.00	180.00	1000.00	20.00	2.00
0	2.80	4.10	15.00	11.00	0.10	2.00	180.00	1000.00	20.00	2.00
0	3.00	4.00	15.00	11.00	0.10	2.00	180.00	1000.00	21.00	2.00
1	1.00	4.50	15.00	11.00	0.10	2.00	180.00	500.00	15.00	2.00
0	1.20	4.40	15.00	11.00	0.10	2.00	180.00	500.00	16.00	2.00
0	1.70	4.30	15.00	11.00	0.10	2.00	180.00	500.00	17.00	2.00

CAPE HORN 4 OCT 79

1	0.40	0.10	3.00	10.00	0.00	3.00	14.00	12.00	-1.00
1	1.50	2.50	6.00	9.00	0.00	3.00	14.00	35.00	-1.00
1	0.10	3.40	6.00	8.00	0.00	3.00	14.00	41.00	1.00
1	1.20	3.80	6.00	7.00	0.00	3.00	14.00	45.00	-1.00
0	1.80	0.80	3.00	9.00	0.00	3.00	14.00	18.00	1.00
0	0.90	0.10	4.00	9.00	0.00	3.00	14.00	20.00	1.00
0	1.10	1.10	4.00	8.00	0.00	3.00	14.00	21.00	1.00
0	1.60	1.60	5.00	7.00	0.00	3.00	14.00	26.00	-1.00
0	1.80	2.50	6.00	9.00	0.00	3.00	14.00	35.00	-1.00
1	0.60	4.90	6.00	4.00	0.00	2.00	14.00	44.00	-1.00
1	1.20	5.70	6.00	4.00	0.00	2.00	14.00	42.00	-1.00
1	0.30	8.20	6.00	10.00	0.00	2.00	14.00	25.00	1.00
0	1.30	5.60	6.00	4.00	0.00	2.00	14.00	43.00	-1.00
0	0.80	6.30	6.00	4.00	0.00	1.00	14.00	40.00	-1.00
0	2.30	5.30	6.00	4.00	0.00	2.00	14.00	44.00	-1.00
0	0.40	7.50	6.00	10.00	0.00	2.00	14.00	31.00	1.00

44349 4 OCT 79

1	1.30	1.30	5.00	7.00	0.00	3.00	10.00	25.00	-1.00
1	0.20	2.00	6.00	9.00	0.00	3.00	10.00	31.00	-1.00
0	1.60	3.30	6.00	8.00	0.00	3.00	10.00	41.00	-1.00
0	0.70	2.90	6.00	8.00	0.00	3.00	10.00	59.00	-1.00
0	0.60	3.80	6.00	6.00	0.00	3.00	10.00	43.00	1.00
0	1.40	5.30	6.00	4.00	0.00	2.00	10.00	43.00	1.00
1	1.30	6.70	6.00	9.00	0.00	2.00	10.00	35.00	-1.00
0	0.40	6.20	6.00	6.00	0.00	1.00	10.00	38.00	1.00

41441 11 OCT 79

1	0.50	3.20	15.00	2.00	1.00	1.00	20.00	38.00	2.00
1	0.40	3.90	15.00	2.00	0.90	1.00	20.00	41.00	0.00
1	1.10	4.40	15.00	1.00	0.70	1.00	20.00	41.00	0.00
1	1.20	4.60	15.00	1.00	0.70	1.00	20.00	41.00	2.00
1	0.60	5.50	15.00	2.00	0.80	1.00	20.00	55.00	2.00
1	1.80	5.70	15.00	2.00	0.80	1.00	20.00	33.00	0.00
0	1.90	3.40	15.00	2.00	1.00	1.00	20.00	39.00	0.00
0	2.30	3.80	15.00	2.00	0.90	1.00	20.00	40.00	2.00
0	0.90	5.00	15.00	2.00	0.80	1.00	20.00	41.00	0.00
0	1.90	5.20	15.00	2.00	0.80	1.00	20.00	40.00	2.00
0	1.80	5.40	15.00	2.00	0.80	1.00	20.00	40.00	2.00
1	0.70	2.70	15.00	3.50	1.00	1.00	20.00	32.00	2.00
1	0.20	3.10	15.00	3.00	1.00	1.00	20.00	36.00	2.00
1	0.50	0.60	15.00	3.50	0.50	1.00	20.00	13.00	2.00
0	1.50	4.20	15.00	1.00	0.70	1.00	20.00	41.00	2.00
0	1.00	2.60	15.00	3.50	1.00	1.00	20.00	32.00	2.00

PT TURNER 11 OCT 79

1	1.00	0.40	15.00	3.50	0.50	1.00	17.00	12.00	2.00
1	1.10	1.10	15.00	3.00	0.70	1.00	17.00	19.00	2.00
1	2.60	1.40	15.00	2.00	0.80	1.00	17.00	21.00	0.00
1	1.50	1.40	15.00	2.00	0.80	1.00	17.00	22.00	0.00
1	0.80	2.00	15.00	2.00	0.80	1.00	17.00	27.00	0.00
1	1.20	2.50	15.00	3.50	1.00	1.00	17.00	51.00	0.00
1	1.90	2.80	15.00	3.50	1.00	1.00	17.00	55.00	2.00
0	2.30	1.10	15.00	3.00	0.70	1.00	17.00	18.00	2.00
1	1.50	2.30	15.00	2.50	0.90	1.00	17.00	29.00	2.00
0	2.30	0.20	15.00	3.50	0.50	1.00	17.00	9.00	0.00
0	0.50	0.90	15.00	3.00	0.50	1.00	17.00	16.00	0.00
0	3.20	2.00	15.00	2.00	0.80	1.00	17.00	27.00	0.00
0	2.80	1.70	15.00	2.00	0.80	1.00	17.00	24.00	2.00
1	0.20	3.30	15.00	2.50	1.00	1.00	17.00	37.00	2.00
1	1.80	3.50	15.00	2.00	1.00	1.00	17.00	38.00	0.00
1	2.60	3.50	15.00	2.00	1.00	1.00	17.00	38.00	2.00
1	1.80	4.00	15.00	2.00	1.00	1.00	17.00	40.00	0.00
1	2.40	4.10	15.00	2.00	1.00	1.00	17.00	41.00	2.00
1	2.10	4.40	15.00	1.00	0.80	1.00	17.00	41.00	0.00
1	1.40	4.80	15.00	1.00	0.70	1.00	17.00	41.00	2.00
1	2.00	5.00	15.00	1.00	0.70	1.00	17.00	41.00	0.00
0	0.60	5.30	15.00	2.00	0.80	1.00	17.00	41.00	2.00
0	3.30	4.40	15.00	1.00	0.80	1.00	17.00	41.00	2.00
0	3.20	5.10	15.00	1.00	0.70	1.00	17.00	41.00	2.00
0	3.70	3.40	15.00	2.00	1.00	1.00	17.00	57.00	0.00
0	2.70	2.90	15.00	3.00	1.00	1.00	17.00	55.00	0.00

PT TURNER 12 OCT 79

1	0.40	0.60	12.00	11.00	1.00	1.00	17.00	5.00	0.00
1	1.00	0.80	12.00	11.00	1.00	1.00	17.00	8.00	2.00
1	0.10	2.10	15.00	11.00	1.00	1.00	17.00	24.00	2.00
0	5.00	1.50	15.00	9.00	1.00	1.00	17.00	13.00	2.00
0	2.50	0.40	12.00	11.00	1.00	1.00	17.00	3.00	0.00
0	1.50	1.50	15.00	9.00	1.00	1.00	17.00	16.00	0.00
0	3.30	1.80	15.00	9.00	1.00	1.00	17.00	18.00	0.00
0	3.70	1.50	15.00	9.00	1.00	1.00	17.00	14.00	2.00
1	2.70	3.40	15.00	12.50	1.00	1.00	17.00	55.00	2.00
1	0.50	3.90	15.00	13.00	1.00	1.00	17.00	56.00	2.00
0	1.90	3.90	15.00	12.50	1.00	1.00	17.00	55.00	2.00
0	2.20	5.20	15.00	16.00	1.00	2.00	17.00	41.00	2.00
0	0.80	4.40	15.00	15.00	1.00	2.00	17.00	59.00	2.00
0	0.90	4.60	15.00	15.00	1.00	2.00	17.00	40.00	2.00
0	3.00	5.80	15.00	17.00	1.00	2.00	17.00	41.00	2.00
0	2.90	5.10	15.00	16.00	1.00	2.00	17.00	40.00	0.00
0	0.80	5.60	15.00	17.00	1.00	2.00	17.00	41.00	0.00
0	1.50	6.50	15.00	20.00	1.00	3.00	17.00	40.00	0.00
0	1.70	2.00	15.00	10.00	1.00	1.00	17.00	20.00	2.00
0	2.20	3.20	15.00	12.00	1.00	1.00	17.00	51.00	2.00
0	2.90	2.50	15.00	11.00	1.00	1.00	17.00	25.00	2.00
0	2.40	4.60	15.00	15.00	1.00	1.00	17.00	59.00	2.00

41585 12 OCT 79

1	1.00	0.20	12.00	11.00	1.00	1.00	21.00	4.00	0.00
1	1.70	1.30	15.00	9.00	1.00	1.00	21.00	17.00	2.00
1	0.90	1.70	15.00	10.00	1.00	1.00	21.00	20.00	2.00
1	0.40	2.20	15.00	11.00	1.00	1.00	21.00	22.00	2.00
0	1.10	0.90	14.00	10.00	1.00	1.00	21.00	13.00	0.00
0	2.30	2.50	15.00	11.00	1.00	1.00	21.00	28.00	2.00
1	0.00	3.10	15.00	12.50	1.00	1.00	20.00	33.00	2.00
0	2.60	4.60	15.00	16.00	1.00	2.00	20.00	41.00	2.00
0	1.00	4.90	15.00	17.00	1.00	2.00	20.00	41.00	2.00
0	1.40	5.70	15.00	20.00	1.00	2.00	20.00	41.00	2.00
0	1.10	5.20	15.00	17.00	1.00	2.00	20.00	41.00	0.00
0	1.30	3.60	15.00	13.50	1.00	1.00	20.00	37.00	2.00
0	0.80	4.30	15.00	15.00	1.00	2.00	20.00	40.00	0.00
0	2.40	4.00	15.00	15.00	1.00	2.00	20.00	59.00	2.00

HH52 16 OCT 79

1	0.30	0.10	15.00	9.00	0.05	1.00	90.00	1000.00	33.00	0.00
1	0.40	0.30	15.00	9.00	0.05	1.00	90.00	1000.00	32.00	2.00
1	1.10	0.50	15.00	9.00	0.05	1.00	90.00	1000.00	29.00	0.00
1	0.20	0.80	15.00	9.00	0.05	1.00	90.00	500.00	28.00	2.00
1	0.30	1.30	15.00	10.00	0.05	1.00	90.00	500.00	24.00	0.00
1	0.10	1.60	15.00	7.50	0.05	1.00	90.00	1000.00	7.00	0.00
1	0.40	2.00	15.00	7.50	0.05	1.00	90.00	1000.00	3.00	2.00
0	1.40	2.20	15.00	7.50	0.05	1.00	90.00	1000.00	2.00	2.00
0	1.10	2.70	15.00	10.50	0.10	1.00	90.00	500.00	-3.00	2.00
1	0.60	2.50	15.00	10.50	0.10	1.00	90.00	500.00	-1.00	2.00
1	0.70	2.70	15.00	10.50	0.10	1.00	90.00	500.00	-3.00	2.00
0	1.20	2.40	15.00	10.50	0.10	1.00	90.00	500.00	0.00	2.00
0	2.60	1.60	15.00	10.00	0.05	1.00	90.00	500.00	22.00	0.00
0	2.00	1.10	15.00	10.50	0.10	1.00	90.00	500.00	-3.00	2.00
0	2.50	0.90	15.00	10.50	0.10	1.00	90.00	500.00	-1.00	2.00

HC130 16 OCT 79

1	0.90	2.80	15.00	10.00	0.05	1.00	180.00	1000.00	28.00	0.00
1	0.50	2.90	15.00	10.00	0.05	1.00	180.00	1000.00	27.00	2.00
0	3.30	3.00	15.00	10.00	0.05	1.00	180.00	1000.00	26.00	2.00
1	0.60	3.10	15.00	10.00	0.05	1.00	180.00	1000.00	25.00	0.00
0	2.30	3.10	15.00	10.00	0.05	1.00	180.00	1000.00	25.00	0.00
0	3.50	2.80	15.00	10.00	0.05	1.00	180.00	1000.00	28.00	0.00
1	3.30	3.40	15.00	10.00	0.05	1.00	180.00	1000.00	18.00	2.00
1	0.30	3.50	15.00	10.00	0.05	1.00	180.00	1000.00	17.00	2.00
0	1.80	3.50	15.00	10.00	0.05	1.00	180.00	1000.00	16.00	0.00
1	1.00	3.60	15.00	10.00	0.05	1.00	180.00	1000.00	15.00	0.00
0	2.70	3.70	15.00	10.00	0.05	1.00	180.00	1000.00	14.00	2.00

HU16E 17 OCT 79

1	0.60	0.10	12.00	15.00	0.00	2.00	145.00	1000.00	9.00	2.00
1	0.80	0.20	12.00	15.00	0.00	2.00	145.00	1000.00	11.00	2.00
1	0.60	0.80	13.00	14.00	0.00	2.00	145.00	1000.00	16.00	2.00
0	1.10	0.60	13.00	14.00	0.00	2.00	145.00	1000.00	15.00	2.00
1	1.10	1.00	13.00	14.00	0.00	2.00	145.00	500.00	20.00	2.00
1	1.10	1.50	13.00	15.00	0.00	2.00	145.00	500.00	24.00	2.00
1	0.50	1.60	13.00	15.00	0.00	2.00	145.00	500.00	38.00	2.00
1	0.80	2.50	14.00	13.00	0.50	3.00	145.00	1200.00	37.00	2.00
0	1.20	1.70	14.00	14.00	0.40	3.00	145.00	1000.00	39.00	2.00
0	1.20	1.90	14.00	13.00	0.60	3.00	145.00	1000.00	39.00	2.00
0	0.20	1.90	14.00	13.00	0.60	3.00	145.00	1000.00	39.00	2.00
0	1.40	2.10	14.00	13.00	0.60	3.00	145.00	1000.00	38.50	2.00
1	0.60	2.60	14.00	13.00	0.30	3.00	145.00	500.00	36.00	2.00
1	0.60	3.00	14.00	13.00	0.20	3.00	145.00	500.00	35.00	2.00
0	1.10	3.10	14.00	13.00	0.20	3.00	145.00	500.00	34.00	2.00

HC130 17 OCT 79

0	0.40	0.00	13.00	14.00	0.00	2.00	180.00	1000.00	20.00	2.00
0	1.60	0.10	13.00	14.00	0.00	2.00	180.00	1000.00	21.00	2.00
0	0.70	0.50	13.00	15.00	0.00	2.00	180.00	1000.00	24.00	2.00
0	1.50	0.60	13.00	13.00	0.00	2.00	180.00	1000.00	25.00	2.00
0	1.00	0.70	13.00	15.00	0.10	2.00	180.00	1000.00	26.00	2.00
1	0.50	0.80	13.00	15.00	0.10	3.00	180.00	500.00	27.00	2.00
0	1.70	1.20	13.00	15.00	0.20	3.00	180.00	500.00	30.00	2.00
1	0.50	1.50	13.00	15.00	0.20	3.00	180.00	500.00	31.00	2.00
1	0.10	1.50	14.00	14.00	0.40	3.00	180.00	500.00	39.00	2.00
0	1.90	1.50	14.00	14.00	0.40	3.00	180.00	500.00	39.00	2.00
1	0.50	1.50	14.00	14.00	0.40	3.00	180.00	500.00	39.00	2.00
0	1.60	1.50	14.00	14.00	0.40	3.00	180.00	500.00	39.00	2.00
1	0.40	1.70	14.00	15.00	0.50	3.00	180.00	500.00	39.00	2.00
0	1.50	1.80	14.00	13.00	0.60	3.00	180.00	500.00	39.00	2.00
1	0.70	2.50	14.00	15.00	0.40	3.00	180.00	1000.00	37.00	2.00
0	0.90	2.50	14.00	15.00	0.50	3.00	180.00	1000.00	36.00	2.00
0	1.00	2.60	14.00	15.00	0.50	3.00	180.00	1000.00	36.00	2.00

44549 18 OCT 79

1	1.30	1.20	8.00	5.00	0.70	0.00	10.00	7.00	0.00
0	1.50	2.20	8.00	5.00	0.70	0.00	10.00	-5.00	2.00
0	1.70	1.90	8.00	5.00	0.70	0.00	10.00	0.00	2.00
0	1.80	2.10	8.00	5.00	0.70	0.00	10.00	-2.00	2.00
0	2.20	2.70	8.00	5.00	0.70	0.00	10.00	-6.00	2.00

PT BONITA 18 OCT 79

1	1.00	0.80	8.00	5.00	0.90	0.00	16.00	17.00	0.00
1	1.50	1.70	8.00	5.00	0.70	0.00	16.00	6.00	2.00
1	0.70	2.20	8.00	5.00	0.70	0.00	16.00	2.00	2.00
0	1.80	2.40	8.00	5.00	0.70	0.00	16.00	-1.00	2.00

41385 22 OCT 79

1	0.70	0.50	2.00	4.00	0.00	1.00	20.00	36.00	0.00
1	0.30	1.40	5.00	4.00	0.00	1.00	20.00	35.00	0.00
0	1.70	0.60	2.00	4.00	0.00	1.00	20.00	36.00	0.00
0	1.00	0.70	3.00	4.00	0.00	1.00	20.00	36.00	0.00
1	0.10	4.60	5.50	12.00	0.00	1.00	20.00	7.00	0.00
0	1.40	4.20	6.00	11.00	0.00	1.00	20.00	12.00	0.00
0	1.10	3.70	6.00	9.00	0.00	1.00	20.00	17.00	2.00

CAPE FAIRWEATHER 22 OCT 79

1	0.10	2.00	5.50	4.00	0.00	1.00	12.00	32.00	0.00
1	0.20	4.10	6.00	10.00	0.00	1.00	12.00	14.00	2.00
0	1.40	0.30	2.00	4.50	0.00	1.00	12.00	36.00	0.00
0	1.20	3.10	5.50	7.00	0.00	1.00	12.00	24.00	0.00
0	0.80	3.80	6.00	9.00	0.00	1.00	12.00	18.00	0.00

CAPE GEORGE 22 OCT 79

1	0.30	0.90	3.00	4.00	0.00	1.00	14.00	36.00	0.00
1	0.60	2.60	5.00	5.00	0.00	1.00	14.00	30.00	0.00
0	1.50	3.10	5.50	6.00	0.00	1.00	14.00	27.00	0.00
0	1.50	1.80	6.00	4.00	0.00	1.00	14.00	34.00	0.00
1	0.10	5.70	6.00	11.00	0.00	1.00	15.00	2.00	0.00
0	1.70	4.70	6.00	11.00	0.00	1.00	15.00	12.00	0.00

HHSF 23 OCT 79

1	0.60	1.20	7.50	8.00	0.25	1.00	110.00	500.00	32.00	0.00
1	0.40	1.80	6.50	7.50	0.30	1.00	110.00	1000.00	29.00	0.00
1	1.40	2.00	6.00	7.50	0.30	1.00	110.00	1000.00	28.00	2.00
1	0.40	2.10	6.00	7.50	0.30	1.00	110.00	1000.00	27.00	2.00
0	1.70	1.70	6.50	7.50	0.30	1.00	110.00	1000.00	30.00	0.00
1	2.50	2.20	6.00	7.00	0.50	1.00	110.00	1000.00	26.00	2.00
1	0.60	2.30	6.00	6.50	0.50	1.00	110.00	1000.00	2.00	0.00
1	0.50	2.50	6.00	7.50	0.50	1.00	110.00	1000.00	0.00	2.00
0	3.60	1.60	7.00	7.50	0.30	1.00	110.00	1000.00	30.00	0.00
1	0.70	1.00	7.00	8.00	0.20	1.00	110.00	500.00	33.00	2.00
0	1.90	1.00	7.00	8.00	0.20	1.00	110.00	500.00	33.00	2.00
1	1.30	1.00	7.00	8.00	0.20	1.00	110.00	500.00	33.00	2.00
0	1.20	1.10	7.00	8.00	0.20	1.00	110.00	500.00	33.00	0.00
0	2.80	2.60	6.00	7.50	0.40	1.00	110.00	1000.00	-1.00	0.00
0	3.50	2.20	6.00	6.00	0.60	1.00	110.00	1000.00	2.00	2.00
0	2.20	2.40	6.00	7.00	0.50	1.00	110.00	1000.00	0.00	2.00
0	1.80	2.70	6.00	8.00	0.40	1.00	110.00	1000.00	-2.00	2.00
0	3.40	2.80	6.50	8.00	0.40	1.00	110.00	1000.00	-2.00	2.00
0	2.10	1.90	6.50	7.50	0.30	1.00	110.00	1000.00	28.00	0.00
0	3.60	1.90	6.50	7.50	0.30	1.00	110.00	1000.00	28.00	2.00
0	3.50	0.20	6.00	10.00	0.00	1.00	110.00	500.00	36.00	2.00
0	3.30	1.30	7.50	8.00	0.25	1.00	110.00	500.00	33.00	2.00
0	2.70	1.40	7.00	8.00	0.25	1.00	110.00	500.00	31.00	0.00
0	2.90	0.90	7.00	8.50	0.20	1.00	110.00	500.00	33.00	0.00

HH52 23 OCT 79

1	0.50	0.20	7.50	8.00	0.25	1.00	90.00	750.00	33.00	2.00
1	0.20	0.40	7.00	8.00	0.25	1.00	90.00	750.00	32.00	0.00
0	0.50	0.20	7.50	8.00	0.25	1.00	90.00	750.00	33.00	2.00
0	0.70	0.20	7.50	8.00	0.25	1.00	90.00	750.00	33.00	2.00
1	0.50	1.40	5.50	7.00	0.30	1.00	90.00	750.00	25.00	2.00
0	0.10	1.00	6.00	7.50	0.30	1.00	90.00	750.00	28.00	0.00
1	0.10	1.80	5.50	6.00	0.60	1.00	90.00	1000.00	3.00	2.00
0	0.70	1.70	5.50	6.00	0.60	1.00	90.00	1000.00	4.00	2.00
1	0.40	2.40	6.00	8.00	0.40	1.00	90.00	750.00	-2.00	2.00
0	1.20	1.30	6.00	7.00	0.30	1.00	90.00	750.00	25.00	0.00

HC130 23 OCT 79

1	1.40	0.50	7.00	8.00	0.30	1.00	180.00	1000.00	34.00	2.00
1	0.50	0.50	7.00	8.00	0.30	1.00	180.00	1000.00	33.00	0.00
0	1.60	0.40	7.00	8.00	0.30	1.00	180.00	1000.00	33.00	0.00
0	0.70	0.50	7.00	8.00	0.30	1.00	180.00	1000.00	33.00	2.00
0	0.90	0.80	6.00	8.00	0.30	1.00	180.00	500.00	30.00	0.00
0	1.10	0.80	6.00	8.00	0.30	1.00	180.00	500.00	29.00	0.00
0	1.10	0.90	6.00	8.00	0.30	1.00	180.00	500.00	28.00	2.00
0	0.80	0.90	6.00	8.00	0.30	1.00	180.00	500.00	28.00	2.00
1	1.10	1.30	5.00	4.00	0.80	1.00	180.00	1000.00	8.00	0.00
1	0.50	1.40	5.00	4.00	0.80	1.00	180.00	1000.00	7.00	2.00
0	1.00	1.30	5.00	4.00	0.80	1.00	180.00	1000.00	9.00	0.00
1	1.00	1.50	5.00	5.00	0.80	1.00	180.00	1000.00	6.00	2.00
0	0.90	1.50	5.00	5.00	0.80	1.00	180.00	1000.00	6.00	2.00
0	1.50	1.60	5.00	5.00	0.80	1.00	180.00	1000.00	5.00	2.00
1	0.10	2.30	6.00	8.00	0.30	1.00	180.00	500.00	-2.00	2.00
0	1.70	2.40	6.00	8.00	0.30	1.00	180.00	500.00	-2.00	2.00
0	1.60	2.50	6.00	8.00	0.30	1.00	180.00	500.00	-2.00	0.00
1	0.70	2.50	6.50	9.00	0.30	1.00	180.00	500.00	-2.00	0.00

HH52A 24 OCT 79

1	0.20	1.00	15.00	20.00	0.90	2.00	90.00	1000.00	36.00	0.00
1	1.20	1.40	15.00	18.00	0.80	2.00	90.00	1000.00	35.00	2.00
1	0.40	1.90	15.00	19.00	0.20	3.00	90.00	500.00	25.00	0.00
1	0.50	2.50	15.00	20.00	0.15	4.00	90.00	500.00	20.00	2.00
1	0.80	0.20	15.00	17.00	0.90	1.50	90.00	500.00	36.00	0.00
0	1.00	1.80	15.00	18.00	0.25	3.00	90.00	500.00	26.00	0.00
0	1.10	2.80	15.00	22.00	0.10	4.00	90.00	1000.00	16.00	0.00
0	1.50	3.50	15.00	21.00	0.10	4.00	90.00	1000.00	10.00	0.00
0	1.20	2.40	15.00	20.00	0.20	3.00	90.00	500.00	21.00	2.00
0	1.70	2.50	15.00	20.00	0.20	3.00	90.00	500.00	22.00	0.00
0	1.70	1.90	15.00	19.00	0.20	3.00	90.00	500.00	25.00	0.00

HC130 24 OCT 79

1	0.10	0.30	15.00	15.00	0.70	2.00	180.00	500.00	32.00	0.00
1	0.60	0.50	15.00	16.00	0.60	2.00	180.00	500.00	31.00	2.00
0	1.60	0.70	15.00	17.00	0.50	2.00	180.00	500.00	30.00	2.00
0	1.50	0.20	15.00	15.00	0.70	2.00	180.00	500.00	33.00	0.00
1	0.60	1.10	15.00	18.00	0.30	3.00	180.00	1000.00	26.00	0.00
0	1.40	1.20	15.00	18.00	0.20	3.00	180.00	1000.00	25.00	0.00
0	0.10	0.90	15.00	18.00	0.30	3.00	180.00	1000.00	28.00	2.00
0	1.70	0.70	15.00	18.00	0.40	3.00	180.00	1000.00	29.00	2.00
0	1.60	1.50	15.00	20.00	0.10	3.00	180.00	500.00	5.00	0.00
0	0.30	1.50	15.00	20.00	0.10	3.00	180.00	500.00	3.00	0.00
0	0.00	1.60	15.00	20.00	0.10	3.00	180.00	500.00	2.00	0.00

HH16 24 OCT 79

1	0.40	0.70	15.00	17.00	0.80	2.00	145.00	500.00	34.00	2.00
0	1.50	0.20	15.00	19.00	0.90	2.00	145.00	500.00	36.00	0.00
0	1.50	0.50	15.00	18.00	0.80	2.00	145.00	500.00	35.00	0.00
1	0.60	1.10	15.00	15.00	0.70	2.00	145.00	1000.00	32.00	2.00
0	1.60	1.60	15.00	17.00	0.40	3.00	145.00	1000.00	29.00	0.00
0	1.80	0.90	15.00	16.00	0.80	2.00	145.00	1000.00	33.00	2.00
0	0.40	1.40	15.00	16.00	0.60	3.00	145.00	1000.00	31.00	0.00
1	0.10	2.10	15.00	22.00	0.10	4.00	145.00	500.00	12.00	0.00
0	1.20	1.90	15.00	22.00	0.10	4.00	145.00	500.00	14.00	0.00
0	0.10	2.20	15.00	21.00	0.10	4.00	145.00	500.00	10.00	0.00
0	1.40	2.00	15.00	22.00	0.10	4.00	145.00	500.00	12.00	0.00
0	0.10	3.20	15.00	20.00	0.10	5.00	145.00	1000.00	0.00	0.00
0	1.80	3.20	15.00	20.00	0.10	5.00	145.00	1000.00	0.00	0.00

APPENDIX B

NATIONAL SAR MANUAL SWEEP WIDTH TABLES AND PROBABILITY OF DETECTION CURVES

Sweep Width (W) For Visual Search

(W Given In Nautical Miles)

Meteorological Visibility - Nautical Miles	Altitude 100 ft	LIFERAFTS 0	LIFERAFTS 5	LIFERAFTS 10	LIFERAFTS 20	BOATS (less than 20') 0	BOATS (less than 20') 5	BOATS (less than 20') 10	BOATS (less than 20') 20	BOATS (less than 20') 30	BOATS (20'-60') 0	BOATS (20'-60') 5	BOATS (20'-60') 10	BOATS (20'-60') 20	BOATS (20'-60') 30	BOATS (60'-90') 0	BOATS (60'-90') 5	BOATS (60'-90') 10	BOATS (60'-90') 20	BOATS (60'-90') 30	SMALL SHIPS (500-3000 Gross Tons) 0	SMALL SHIPS (500-3000 Gross Tons) 5	SMALL SHIPS (500-3000 Gross Tons) 10	SMALL SHIPS (500-3000 Gross Tons) 20	SMALL SHIPS (500-3000 Gross Tons) 30	MEDIUM SHIPS (3000-10,000 Gross Tons) 0	MEDIUM SHIPS (3000-10,000 Gross Tons) 5	MEDIUM SHIPS (3000-10,000 Gross Tons) 10	MEDIUM SHIPS (3000-10,000 Gross Tons) 20	MEDIUM SHIPS (3000-10,000 Gross Tons) 30	LARGE SHIPS (Over 10,000 Gross Tons) 0	LARGE SHIPS (Over 10,000 Gross Tons) 5	LARGE SHIPS (Over 10,000 Gross Tons) 10	LARGE SHIPS (Over 10,000 Gross Tons) 20	LARGE SHIPS (Over 10,000 Gross Tons) 30
1	0.5	0.5	0.5	-	0.5	0.5	0.5	-	-	0.5	0.5	0.5	-	-	1.0	0.5	0.5	-	-	1.0	1.0	1.0	-	-	1.0	1.0	1.0	-	-	1.0	1.0	1.0	-	-
3	1.0	1.2	1.2	1.0	2.5	2.4	2.3	1.8	0.4	3.5	3.0	2.7	1.8	0.4	3.9	3.4	3.2	1.8	0.4	4.2	3.8	3.2	1.8	0.4	4.6	4.0	3.3	1.8	0.4	4.7	4.0	3.3	1.8	0.4
5	1.4	1.6	1.6	2.7	2.7	2.7	2.7	3.2	3.3	4.2	4.2	4.2	4.2	3.3	5.0	5.0	4.9	4.7	3.3	7.1	6.7	6.2	4.9	3.3	8.0	7.0	6.2	4.9	3.3	8.0	7.0	6.6	4.9	3.3
10	1.8	1.8	2.1	3.6	3.9	4.0	4.2	4.5	5.8	6.5	6.2	6.2	6.2	6.5	8.0	8.0	7.9	7.7	7.2	11.0	10.0	9.8	8.6	7.2	11.0	10.6	10.2	9.0	7.2	11.0	10.6	10.2	9.1	7.2
15	1.9	1.9	2.6	3.6	5.2	5.3	5.5	6.7	7.0	8.5	8.5	8.4	8.4	8.3	11.0	9.9	9.6	9.1	8.5	13.4	12.7	12.0	10.5	9.1	14.0	13.7	13.3	11.4	9.4	14.0	13.9	13.7	11.6	9.5
20	2.0	2.1	2.8	3.6	5.3	5.6	6.2	6.8	7.1	8.6	8.8	9.0	9.1	8.9	12.0	11.0	10.6	10.0	9.3	15.0	14.3	13.5	11.9	10.4	15.0	15.0	15.1	13.0	10.9	15.0	15.0	15.6	13.3	11.1
30	2.2	2.3	2.9	3.6	5.5	6.2	7.0	7.0	7.1	8.7	9.5	10.4	10.1	9.7	12.5	12.5	12.1	11.3	10.5	17.0	16.5	15.7	13.9	12.2	17.0	17.0	17.0	15.4	13.1	17.0	17.0	17.0	15.8	13.4
40	2.3	2.4	2.9	3.6	5.6	6.3	7.1	7.1	7.2	8.9	10.0	11.0	10.8	10.3	13.0	13.0	13.2	12.2	11.3	17.0	17.0	17.2	15.3	13.5	17.0	17.0	18.0	17.1	14.7	17.0	17.0	18.0	17.5	15.0
50	2.2	2.4	3.0	3.6	5.7	6.4	7.2	7.2	7.3	9.0	10.0	11.9	11.3	10.7	13.5	13.5	14.0	13.0	11.9	20.0	19.3	18.4	16.4	14.5	20.0	21.0	20.8	18.3	15.9	20.0	21.0	21.0	18.9	16.5

Figure 8-67a

WHITECAP CORRECTION FACTOR (f_W)

WIND (kts)	0	10	15	20	25	30	40	50	60
Rafts	0.8	1.0	0.9	0.7	0.5	0.2	0.1	-	-
Boats	0.9	1.0	1.1	1.0	0.9	0.7	0.2	-	-
Ships	1.1	1.0	1.0	0.9	0.8	0.7	0.5	0.2	-
Dye Marker	0.9	1.0	1.0	0.9	0.6	0.4	0.2	-	-
Smoke	0.8	1.0	0.8	0.6	0.4	0.2	0.1	-	-

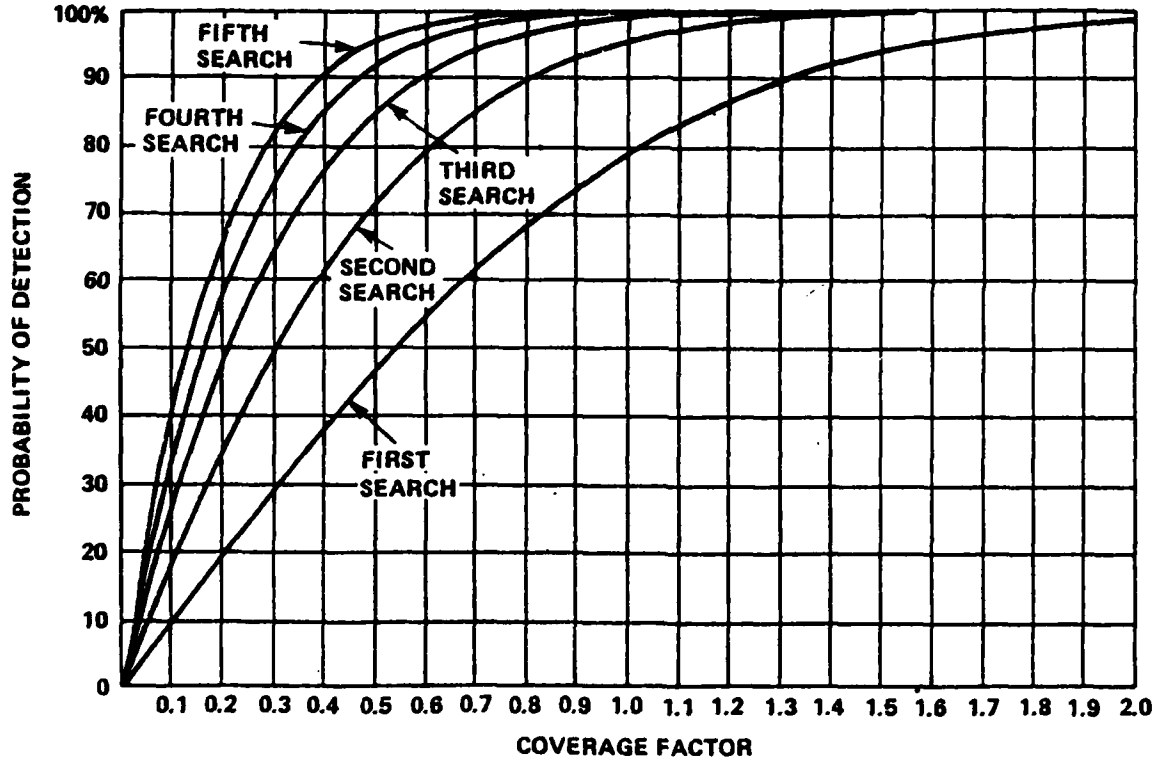
Figure 8-67b

LIGHTING CORRECTION FACTOR (f_L)

Percent Cloud Cover	0	10	20	30	40	50	60	70	80	90	100
Cloud Cover Factor	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.7

Figure 8-67c

FIGURE 8-67



PROBABILITY OF DETECTION

APPENDIX C
METRIC CONVERSION FACTORS

1. Feet to Meters

1 foot = 0.3048 meters

Thus:

3 to 4 foot swells ≈ 1 meter swells,
a 16-foot boat ≈ a 5-meter boat, and
an altitude of 500 feet ≈ a 150 meter altitude.

2. Nautical Miles to Kilometers

1 nautical mile (nm) = 1.852 kilometers (Km)

Thus:

10 nm visibility ≈ 18.5 Km visibility, and
a 2 nm range ≈ 3.7 Km range.

3. Knots to Meters/Second and Kilometers per Hour

1 knot = 0.5144 meters per second
1 knot ≈ 1.852 kilometers per hour

Thus:

a 10-knot wind speed ≈ 5 meter per second wind speed,
and a 10-knot search speed ≈ 18 kilometer per hour search speed.